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FEATHER BRAINS

By DIANA THORNE

With illustrations by the Author

THE SUMMER has gone; and with it Bo-bo.

The rake is busy with the fall. The foliage is rioting with red and yellow and a chill is in the air—the chill of loss.

Bo-bo, who, a day before, seemed inseparable from our own scheme of life, will not, as we had hoped, return with us to learn the ways of cities. Bo-bo, who had so much curiosity about everything, has passed with the summer!

Our meeting with Bo-bo, who, we must hasten to explain, was a member of the clan Blue Jay, was not without dramatic element. Walking on a hot afternoon of early spring in New England, under the greening shade trees of a nearby lane, we were startled by an outburst of shrieks, screams and violent imprecations from above. Was it murder under the elms?

As we stared upwards, fascinated by the uproar, there came tumbling into our hands a squawking, fluttering, small soft lump of feathers of brilliant metallic blue-and-white. A moment before I had seen it precariously perched at the outer end of a broken branch, quivering before the sinuous and swift approach of a marauding weasel.

Almost at the very instant of the descent of the little one, Father and Mother Blue Jay, leaving the bandit for later attention, made an attack on the innocent bystander so vigorous as to knock our hat over our eyes and their offspring out of our grasp. They attacked with beak and wing like a couple of harpies, yelling vengeance on all things created outside their own clan.

We recovered our breath to discover Bo-bo on the ground hopping about excitedly and aimlessly; his parents, puzzled and angry, endeavoring with pecks and pushes to make the infant understand that a return to the nest was in order. Their idea was, or seemed to be, that if they could get him to hang on to either one of them, he could be carried up. But Bo-bo would have none of that. Having reached the ground safely, and having eluded an enemy, he considered the world his and the wider it was the merrier!

He was, therefore, hopping and flapping to the middle of the road and into the way of danger, a modern child of free thought and self-determination asking his distracted parents what they proposed to do about it. I decided to intervene, and, snatching him up, placed him on a branch above my head. There followed an amusing family re-union.

Until this experience I had no idea of the amount of racket a few birds could make when in full orchestration. I had to reassure myself that it was really bird-talk and not a riot with police in action. A whole Jay clan meanwhile appeared to have gathered in the tree from the neighborhood. They wheeled and darted and screamed advice, warnings and insults.

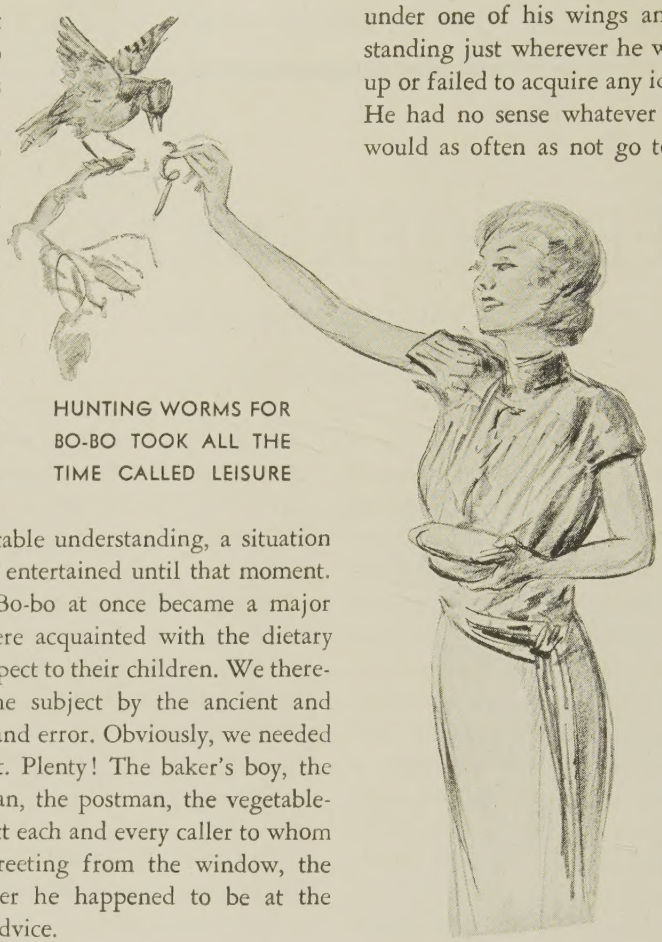
Mamma and Papa Blue Jay had been, no doubt, doing their best in noisy argument and pleadings in concentration on the problem of the bringing up of Bo-bo. But as I turned to note the result of my efforts to unite a family, I saw the infant refuse parental advice and flop to the ground again.

This would have warned any less impulsive person than myself of the nature of the young fellow's temperament. I had but one thought—to save the little beggar from the dangers of the road and to return him to his nest later when his pinions had grown to carrying power.

Thus I felt I had no alternative but to grab him. Shielding my face and hair as much as I could from the furies, I picked him up and fled from the scene.

For half a mile or so I was escorted by the irate parents, some relatives and a few neighbors who did their best to knock me down. I held Bo-bo hidden in my sweater. The frantic appeals to him from his kindred only evoked a fatuous and self-satisfied squeak. Possibly he was suggesting that they all mind their own business.

We improvised a house for Bo-bo, a roomy box with little twigs and a thing that we considered might be a fair imitation of his nest. But he would have none of it! His first act was to flop to the ground and then scramble into our kitten's saucer. The fact that Winkie, the kitten, was busy there at the moment bothered Bo-bo not at all. He hopped on the kitten's back, the better to inspect the food, gave her a sharp peck on the head with his beak, flapped his wings, screamed, slid over into the cream and managed to get a few gobbles of his bath into himself.



HUNTING WORMS FOR BO-BO TOOK ALL THE TIME CALLED LEISURE

Winkie, possessed of a strong maternal instinct, got the idea at once. There was, therefore, no necessity for a formal and cautious introduction. Bo-bo had introduced himself. Winkie and he arrived instantly at an amicable understanding, a situation that allayed fears we had entertained until that moment.

The proper food for Bo-bo at once became a major problem. None of us were acquainted with the dietary ideas of blue jays with respect to their children. We therefore did our best on the subject by the ancient and honorable system of trial and error. Obviously, we needed advice and advice we got. Plenty! The baker's boy, the butcher's boy, the milkman, the postman, the vegetable-man, the gardener—in fact each and every caller to whom Bo-bo yelled a cheery greeting from the window, the door step, or wheresoever he happened to be at the moment, was avid with advice.

There was no need for anxiety however. Bo-bo thrived. He grew in size and strength and noisiness till the day when he went into the apple tree under his own power.

Now was the hour, we said: Now was the time when we must make good the promise to restore the child safely to his parents. The decision was difficult. By this time we had become pretty fond of the creature. He was an established member of our *ménage*—in good standing if we ignored the housemaid's bitter remarks on "white wash and extra cleanin' ". However, righteously albeit sorrowfully, we took Bo-bo back to the scene of his birth, and we left him there with tears and prayers for his welfare.

When we returned, it was to find to our amazement that Bo-bo had, in the expressive phrase, "beaten us to it". There he was on his branch in the old apple tree and he greeted us derisively. It would seem, he tried to make us understand, that he was a permanent and not a transient guest.

Bo-bo's favorite diet was worms. Hunting for these kept most of us occupied in the small amount of time we could consider as our leisure. Bo-bo either decided that his beak in its immature state was untrustworthy or he was too lazy, which we suspected, to give us any help. But he was always close at hand when we dug up a worm, cheering us on to harder work and uttering sarcastic comments at moments of pause in our toil.

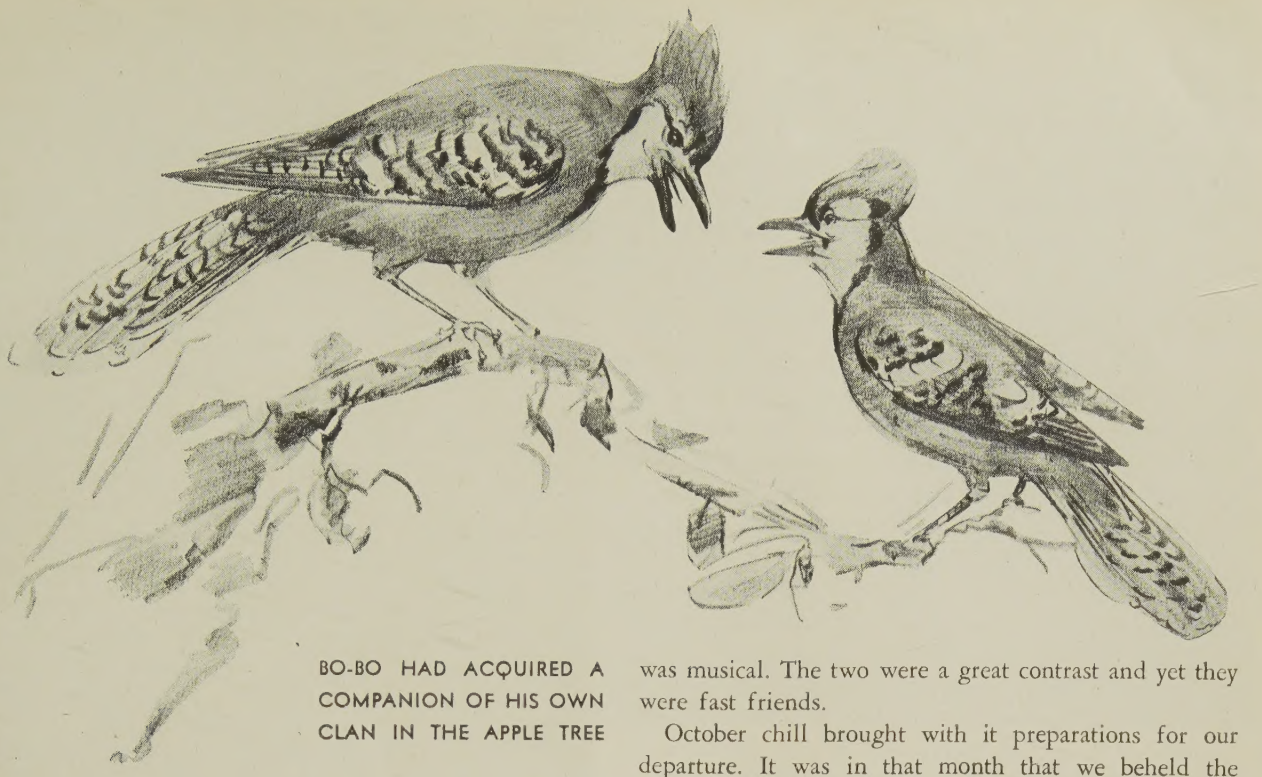
We never saw or heard of such an appetite in a bird before. Respite from his demands was only possible, when, quite suddenly replete, he would push his head under one of his wings and fall fast asleep, sitting or standing just wherever he was. He seemed to have given up or failed to acquire any ideas of taking care of himself. He had no sense whatever of the fitness of things. He would as often as not go to sleep in the middle of the path to the gate. Upon being lifted to a safer spot, he would protest until more worms became necessary as a soporific.

Grasshoppers he liked as occasional delicacies and some enormous specimens he would demolish thoughtfully with grave concentration on the business of dissection, rendering him oblivious to all movements near him. Winkie, the kitten, was a fascinated observer on these occasions. The process never failed to win her approval and admiration.

Bo-bo drank a great deal of water and as he refused to drink from his trough after bathing in it (which he did whenever he drank), it was not unusual to find him in the kitchen gobbling the tap drip or screeching for the faucet to "get busy". Cooking and dish-washing intrigued his interest more than it did that of the maid.

He could now fly capably and fly he did, but never, except on one occasion, did he leave our garden. He knew all our voices, could identify each one and always came promptly to our shoulders from wherever he might be, unless he was asleep, in which case apparently no noise could waken him. On the one occasion he had winged his way to the gate from tree to tree and there, from the eminence of a fir, he no doubt espied the house of a neighbor on the other side of the lane.

Coming home on that evening, we found a dear old lady pacing the road and plaintively calling "tweet, tweet, tweet". She quivered with excitement in describing her adventure of finding a dear little bird—a little lost and



BO-BO HAD ACQUIRED A COMPANION OF HIS OWN CLAN IN THE APPLE TREE

hungry bird, crying on her porch. She had soothed it, she said, with chopped egg and bread crumbs, when as suddenly and as mysteriously as he had come, he vanished. She was distressed. Had we seen the poor little, lost creature? We thought we had. We took her to our cottage and showed her Bo-bo who was yelling for service. He did not even bother to salute his good samaritan!

With new possibilities open to him by flight, Bo-bo diverted himself with the stairway in the cottage. He had previously satisfied his curiosity by climbing up after us step by step. Now it seemed, it amused him hugely to fly up and down. Thus it was well nigh impossible to foretell in which room in the house he might be found, or what he might be doing when found. His joyful chatter and cheery nature, however, disarmed all criticism.

We thought that Bo-bo's presence at meal times was unnecessary, but we do not recall one instance when he was absent. The gong never failed to send him into a fever of excitement and delighted whoopings. At table he varied his position from shoulder to shoulder, but occasionally he liked to jump to the table and inspect more closely whatever seized his fancy.

Winkie, the kitten, on the other hand, had perfect manners. She behaved somewhat like a demure little girl of the 'Sixties. She was sweet, obedient, prim and quiet. None of these adjectives could in fairness be applied to Bo-bo. Winkie spoke only when spoken to and her mew was musical. The two were a great contrast and yet they were fast friends.

October chill brought with it preparations for our departure. It was in that month that we beheld the miracle. Bo-bo had acquired a companion in the apple tree, a companion of his own clan. He was in deep conversation with this individual. Their heads were close together. They gabbled, preened and hopped around excitedly. We called Bo-bo and, for the first time, he failed to respond. It became clear that we were *de trop* at that moment. Affairs of greater importance had entered into the life of Bo-bo.

When he finally came to us he seemed *distrait*. The chill in the air passed to our thoughts.

Bo-bo did not breakfast with us next morning. Bo-bo had gone from our house and garden.

We tried to imagine the conversation between Bo-bo and the Emissary. Were we not migrants ourselves?

"What do you know about the winter hereabouts, my boy? Nothing! Well, you'll know plenty if you stay on here. Come with us. We're packing up today. Breaking camp for the season. Going South, my boy. You can't go with these people. Don't be a fool about it. They mean well, but take it from me, there are no trees where they're going. You don't want to be indoors in an awful human cage for six months, do you? That's all right for canaries and perhaps parrots but not for fellows like us.

"Come on with us, I say. We'll be back next spring. Don't be a hanger-on! Depend on yourself. Be wise. In a month there won't be cover enough around here for anything except a sparrow. Get ready. I'll be around for you first thing in the morning. So long."

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Our December issue will contain a number of articles appropriate for the Christmas season that will be enjoyed by our readers, including *Nature Decorations for Christmas* by Ann Bryant and *Year-Round Christmas Trees* by Vernon Bailey. We are especially proud of the December rotogravure section, containing as it does many beautiful scenes of winter.

Unfamiliar Chats

By RAYMOND S. DECK

IN A LECTURE some years ago a noted bird photographer mentioned the yellow-breasted chat as being impossible to photograph at its nest because of its shyness and the flimsiness of its parental instinct. In trips afield after that I always kept an eye to chatward. The big, handsome warblers were not any too common. Several times I heard one in a tangled swampy field on the rim of New York City but never found a nest. Then last spring I happened upon a very chattery on a public picnic ground within the limits of a thriving suburban city. Here I heard the chortlings not of one chat but of many—*"C-r-r-r-r-r—whrr—that's it—chee—quack, cluck, yit, yit, yit—now hit it—tr-r-r-r—when—caw—caw—cut, cut—tea-boy—who, who—mew, mew."* Such vocal *pot-pourris* came now from various points over the brushy slope, but they seemed to be voices without origin for not a bird could be seen even by slipping furtively about one articulate clump after another. Then I had just a glimpse of a greenish-backed bird as it slipped through the greenbrier. Another paused on a dead twig and I saw its glowing gold breast and its trim, well-tailored look.

Dr. Chapman has described the catbird's cry of *Snake!* as "one of the most disagreeable sounds in nature," but the distress call of the chat is even worse. *Whanh-nh-nh,* it sounded now from a dingle of birch brush. A glance disclosed the nest of the complaining bird, well-knit of leaves and heavy grasses, securely bound in the crotch of a low bush. In the course of another hour's search I located three more nests, all containing their full quota of four or five speckled white eggs, but, because of their locations, none of the nests would do for photography.

Some days later I was again prowling around the chat-haunts. Picnickers had removed the eggs from the first nest and two others were deserted. I poked into some scores of thorny brush clumps before I chanced on another nest. Slung in a wild rose bush where only a few thin twigs shielded the four nestlings from the light, this one was auspicious for photography. Late that afternoon I placed a blind in the swamp before the chat home. Next morning, the birds had not deserted the young but they were very shy. I sat in the blind for hours while the parents whined about in the underbrush, occasionally approaching the nest to within a few yards, but always ending by slinking off. The fledglings could not do without food any longer so I went away. The following day was gray and drizzly but it was the last available so I arrived early. As I approached the nest I saw both parents there, feeding. When they disappeared in search of more food I got quickly into the blind. A parent came shortly, bearing a fat green caterpillar, but just before reaching the nest, sensed something ominous. *Wanh-nh-nh!* she announced mournfully. Her mate appeared to see if it were really true, and the swamp was straightway filled with wailings. I left. Four times within the next hour I tried to get into the blind unseen, but each time the birds caught me. About noon, I finally managed to sneak in on them, and during the next hour had the thrill of watching the handsome male tend the young several times. After feeding he would fly up in a nearby tree and, between accusing peeps into the blind, would indulge his ego in a series of hollow, ventriloquial whistles, *toot! toot! toot! Flicker! flicker! Whack!*

THE YELLOW-BREASTED CHAT
This shy bird is one of the most difficult to photograph

The mother never got up her courage to the point of coming to the nest. After much slipping about and complaining she would always devour the insect in her bill. After a while the male too became too nervous to come near. A full two hours went by without any attention to the young. The nest was in imminent danger of desertion so I pulled my boots up out of the swampy muck and, somewhat after the manner of the noted Arabs, folded up my umbrella blind and went home.

The fledgling chats left their nest in good shape a few days later. By late August all of their kind were off under cover of night for Central American jungles, leaving the birch-dotted slopes to woodcock and Sunday picnickers.

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In the December issue of Nature Magazine, John Lindsey Blackford, prose-poet and naturalist of Montana, returns to our pages with another delightful story. There will be other interesting features appropriate to the coming holiday season.

THE RED FOX IS AN ANIMAL OF INTELLIGENCE, CUNNING AND SPEED

He therefore is one wild creature that has been able to hold his own against the hunter and the trapper. This fox was taken in a humane trap near Wild Acres, Md., in July, when he was in his summer coat of short hair

The Red Fox in America

By VERNON BAILEY

Photographs by the Author

THE GEOGRAPHY of wild animals is as fascinating as the geography of man and leads us back farther into the dim past and as far into the no less dim future. It spreads like a sea of rising and falling waves of types and varying forms, of beginnings and endings of species and families and orders, of the migrations and struggles of those that survive and those that disappear, not unlike our own struggles, for we too are only one of the higher groups of mammals. We pride ourselves on our superior intelligence, and our family trees, but we can still learn much from our humble relatives all along the line.

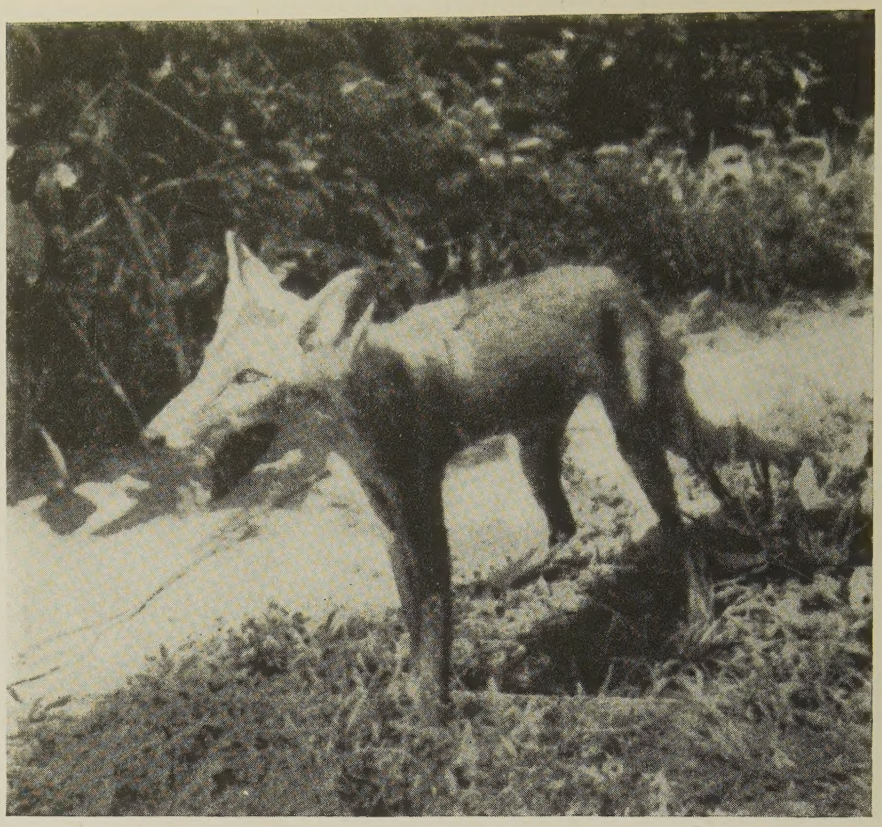
If the North American Indians had been as crafty and cunning, as resourceful and adaptable as their brothers, the red foxes, they might have survived in greater numbers in a civilization not their own. Just stop and think of a race of animals that ranges across the North American Continent, with a high price on their beautiful furry red or silver or black coats, sought for by successive generations of eager hunters and trappers, chased by thousands of dogs and horses trained for their capture, and yet remaining nearly as abundant as they were centuries ago. It seems unbelievable but it is, nevertheless, a fact.

A hundred and fifty years ago George Washington hunted foxes around Mount Vernon and other plantations within a day's ride by horseback, and while the foxes generally escaped he had much pleasure and exercise in their pursuit and in the good company of his horses and dogs and, occasionally, a few choice friends. Those days are long gone but red foxes still range in the larger timber tracts around Mount Vernon and Wakefield, and all around and even within the District of Columbia. In fact they occupy most of their original territory, and over many of the less populated areas are perhaps as numerous as they ever were. This is due partly to the litters of six or seven young and partly to a keen sense of self preservation.

There can be no exact comparison of the numbers of foxes now living with those of earlier dates, but in many suitable areas there are still enough to keep the country well stocked and to take care of the food supply most to their liking. Their presence adds a charm to any wilderness area, even though they may be rarely seen or heard. Their unmistakable tracks are the best guide to their abundance, and their occasional droppings along the trails the best evidence of their food habits at different seasons. The astonishing part of their record is that they have held

their own against such great odds while many of our native species have been nearly or entirely exterminated over wide areas. The natural intelligence, cunning, speed and fighting strength of the foxes have given them an advantage over most wild animals.

While we are often exasperated by their raids on our chicken yards and their destruction of small game that we would like to have for our own use, we can not help admiring these beautiful, nervy neighbors. Nor need we worry much about their mischief, for if they become too numerous locally there are always hunters and trappers eager to get their valuable pelts. In the long run our intelligence and inventions are more than a match for their cunning and it should be a matter of some satisfaction that their abundance, distribution and perpetuation are wholly within our control. The time is rapidly coming when game and fur animals and wild life generally will be given as appreciative and intelligent care as that now given to our domestic herds and flocks, our animal friends and pets.



IN SUMMER SHORT HAIR REPLACES LONG WINTER FUR

This old male fox was examined for parasites that might convey tularemia or spotted fever, but the tests were negative. He held his mouth agape because of the hot July day, not because of a ferocious nature

In home and family life foxes are models of faithful care and affection. Once mated a male and female usually remain together as long as they live, and each assumes its natural share of parental duties with mutual understanding and unselfish devotion. In many cases, in my youth in Minnesota, have I found an old male fox, curled up on guard near the entrance to the burrow where the mother and her babies were safely hidden, keeping watch for the approach of enemies that he might drive off or lead away from the den. With me it was always his effort to attract my attention and lead me away, but with any animal of his own size it would have been pursuit or a fight.

At a den that I found in the Adirondacks while snowshoeing among the deer yards, the old male fox had been out hunting and his fresh tracks on the snow showed that he was carrying a heavy load. At a little distance the tracks led to a large burrow on a hillside, where the snow was well trampled and marked by the tracks of both old and young foxes. The load the fox had been carrying was the head of a yearling fawn, probably of one killed in the previous hunting season or one that had lost its mother and died during the winter. It was a heavy load for even a strong male fox but it would provide several good meals for the mother, and many days of practice for the budding teeth of a large family of youngsters, just beginning to come out of the nest burrow.

Most of the food brought in to the den consists of small game—rabbits, squirrels, ground squirrels, woodchucks, gophers, chipmunks, rats, or mice, and occasionally a grouse or quail or poultry.

Only while the young are small does the father fox do most of the hunting. As soon as they can be left alone the mother fox makes short trips for food and often visits carcasses of dead deer or other animals killed by hunters, wolves or dogs, or possibly cattle that have died and have been hauled out to the fields. Meat in the north country keeps fresh all winter and when it thaws out in the spring is often in prime condition for food.

Later in the spring when the half-grown foxes are being weaned they begin to run with the parents on short forays at night and are taught to catch mice and birds, grasshoppers, crickets and beetles, and learn for themselves what is good and what is not good to eat. They keep close to the mother, but if father fox finds a dead sheep or pig or succeeds in capturing a young lamb he leads the family to a great feast and his pride and satisfaction can well be appreciated by any big game hunter who has helped feed his own family by his skill in the chase.

Summer is the time of plenty for the foxes. First the strawberries ripen and become a welcome change from an all-meat diet. Mice, early or over-wintered berries, a few frogs, grasshoppers and other insects, or an occasional bird or nest of eggs afford a wholesome variety for a carnivore with omnivorous tastes. Later in midsummer the blueberries ripen. These big blue bunches of sweet delicious fruit provide the greatest feast of the year for the fox. If berries are abundant, even mice and birds are somewhat neglected at this season. Still later dewberries,

AN ADIRONDACKS SPECIMEN
This red fox was caught in a humane trap that did not injure his foot nor cause pain

raspberries, blackberries, service berries, wild plums and grapes, peaches and apples help out with a varied diet that lasts well into the fall. Frozen apples furnish some winter and even spring food. Nuts, acorns and seeds are also eaten. Beech nuts are a favorite food, and where they grow and yield well they sometimes can be found all through the winter and spring.

By the time the first snows arrive the young foxes have grown up to be good hunters, competent to take care of themselves. But, alas, their care-free life is over, for each has then a thick warm coat of fur with a high price on it. Only the more wary and intelligent can hope to escape the deadly traps set stealthily for their light feet and baited with alluring and tantalizing odors placed to reach their keen and inquisitive noses.

Many are taken every year but those that escape grow more and more suspicious and wary until the trappers become discouraged and give up while there are still enough foxes left for a good start next year. If I could write in fox language I would tell them all how to keep out of traps but then there might soon be so many foxes that they could not find enough to eat, the mice, rabbits and squirrels, the bobwhites, grouse, wild turkeys and many other birds would be eaten and there would be a great depression, and sadness in the fox world. So what can we do about it unless we can in some way soften the trap jaws so they will not hurt? This we are trying to do, and at the same time we are endeavoring to teach a more kindly and appreciative feeling toward our outdoor neighbors.

Red foxes have been almost domesticated, perhaps more nearly so than any other of our North American mammals. Still, they can not be considered domestic animals as they would take to the woods at once if released. The value of their fur, especially of the once rare black and silver individuals, has continued to be high, and the long-continued efforts to raise them have been successful and in certain cases profitable. The choicest varieties have been developed, and high prices are paid for the best breeding stock, but the business has become so technical and highly specialized that only professionals are safe in entering the field. So many skins are produced each year that the market is well supplied and the excessive prices of other days no longer prevail. Better furs are produced in this way, however, than those caught in the wild, and there is less cruelty in raising than in trapping the animals in the wild.

The ancient sport of "riding to hounds" in pursuit of foxes is still practiced in some sections of the country but is losing much of its significance since the automobile has so largely displaced the horse. Fortunately, the fox usually gets away and can be hunted another day. The demands of fox-hunters result in some protection, and altogether fox-hunting is probably of benefit to the animal.

While foxes belong to the same family as the dogs and wolves, they form a group or subfamily of their own with several genera and species, of which the red foxes are the best known and most widely distributed. Red foxes occur over most of the Northern Hemisphere and there are about a dozen recognized forms in North America, and probably as many in the Old World. Their distribution in America is roughly shown on the accompanying map but not too much dependence can be given to boundary lines between geographic varieties that merge into others on all sides.

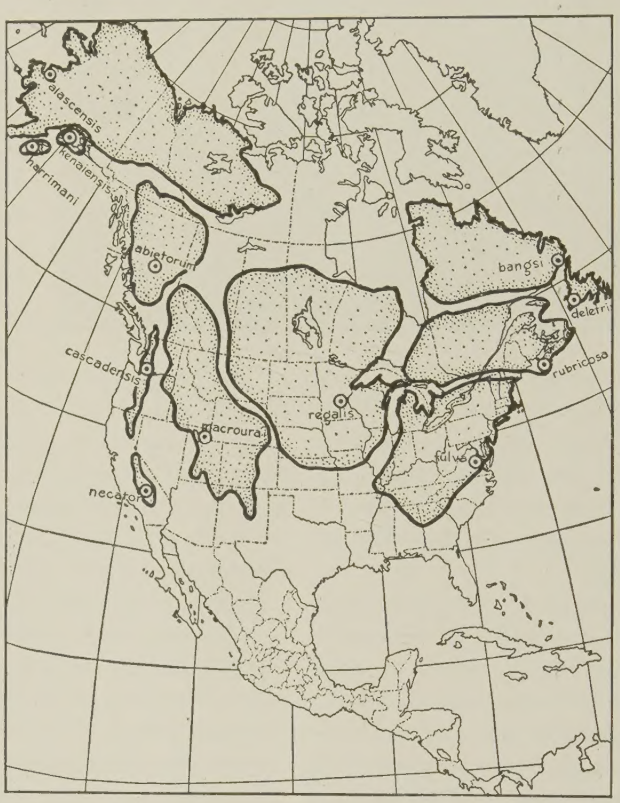
Foxes were among the mammals listed by most early writers on the natural history of the New World, but not until 1820 were they given a specific name to distinguish them from the Old World red foxes, then known as *Canis vulpes.* From Virginia records, Desmarest called them *Canis fulvus,* but already Oken had separated the red foxes from the wolves and dogs, and called the genus *Vulpes.* So our red foxes have long been known to scientific authors as *Vulpes fulvus.*

When specimens collected over different parts of the country were assembled, slight differences were noted in color, size and form, and these geographic varieties were given varietal names. In some cases a definite distribution area can be assigned to these varieties, but in many areas the characters are more or less blended and no sharp lines

of separation can be drawn. In a general way, however, these variants occupy different types of country, and have been developed in direct response to environmental influences, exerted over a long period.

The accompanying map of the red foxes of North America gives the type localities and the approximate ranges of the various forms now recognized. In many places, however, especially in the far north, there are extensive areas from which no specimens are available and where the limits of ranges are doubtful. In fact, Nature does not deal in sharp lines so much as in broad areas.

Red foxes range normally from the limit of trees in the far north to the edge of the cotton belt of the southern United States, through Hudsonian, Canadian and Transition Zones, with a slight degree of wandering into the Arctic Zone on the north and the Austral Zones on the south. They do not reach to the Atlantic Coast south of Chesapeake Bay or to the Pacific Coast south of about the sixtieth parallel. Neither do they penetrate into the arid valleys of the Southwest. A few scattered records over Texas, Louisiana, Alabama, Arkansas, Oklahoma, and Kansas are probably of wanderers, or the progeny of stock introduced for fox hunting. The scattered records from the Arctic Coast may well be of wanderers from the borders of the woods, for such freebooters can not be restrained by mere temperature, and the extent of travel by one or a family of these light footed hunters can hardly be guessed.



THE HAUNTS OF THE RED FOX IN NORTH AMERICA

Vulpes fulva fulva and subspecies can be found in nearly any location north of Mexico except in six of our southernmost states and the deserts

Red foxes are of varying shades of dull red and light or dark yellow, but with all recognized forms there are darker color phases varying to pure black, a graded kind of melanism. The first step is the reddish brown with heavy black markings characterizing the so-called *cross fox*. The next is the all or nearly all black fur, with white zones near the tips of the long hairs that give it the name of silver fox. Last of all is the pure black phase of complete melanism known as the black fox. This was originally the rarest and most valuable fox fur, choice skins often selling for $1000, before the animals were bred in captivity in such numbers as to lose their rarity. At the present time, the ranch-raised silver fox skins are the most valuable and distinctive on the market, although many people consider the red or cross foxes more beautiful. In all the color phases, the tip of the tail is normally white.

Specific and subspecific characters, however, are based mainly on the normal red phase of color and its variation from dark red to light or dark yellow with more or less of black on the feet and legs, back of ears and top of tail, and in some cases on the variation in extent of the usually large white tip of the tail. More important characters are found in size and proportions and in variation of ears and tails, in form of skull, differences in teeth and jaws, and other cranial characteristics.

In habits, the different varieties are similar, these varying mainly in accordance with the differing climate, types of forest, prairie, mountains, shores and islands, and the necessity of subsisting on the various available foods, and withstanding the enemies among which they must live. Intelligence and versatility are dominant characteristics of red foxes.

The brain cavity of the skull of an adult male red fox of about 15 pounds in live weight holds 183 small white beans or about 12 beans to a pound of bodily weight. The skull of a 30-pound coyote holds 338 of the same beans or about 11 beans to a pound of weight, and a collie dog of about 35 pounds holds 361 beans, or about 10 to a pound of weight. While this is a crude comparison of little real value, it is not without significance.

While several variations of the North American red foxes have been described as distinct species, there seems to be more or less intergradation among the mainland forms while the two insular forms, from Newfoundland and Kodiak Island, show subspecific rather than specific characters. Most naturalists agree that the North American red foxes are distinct from the Old World forms but the Siberian and Alaskan specimens show close relationship, indicating that they are derived from a common stock.

List of North American Red Foxes

For the present therefore it seems best to consider all of the North American forms as subspecies of

Vulpes fulva fulva (Desmarest), described in 1820.
Type locality Virginia

A rather small, slender, dark red fox of the Eastern States and southeastern Canada. (Continued on page 317)

Conrad, the Reticent

By KATHERINE V. W. PALMER

ABOUT one hundred years ago, at the same time that Audubon, the famous naturalist, was endeavoring to publish his great work on the "Birds of America", a less assuming but none the less important scientist was striving to publish the descriptions and illustrations of the past life of the ancient seas of the eastern and southern shores of the United States.

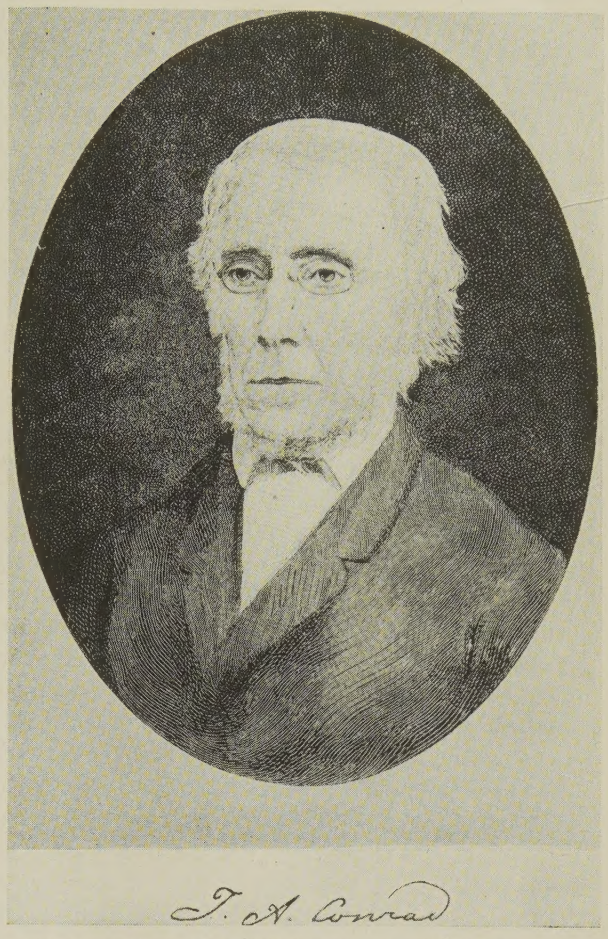
Timothy Abbott Conrad, paleontologist, geologist, conchologist, naturalist, poet and artist, in 1831-32 published the first numbers of the *Marine Conchology* and the *Fossil Shells of the Tertiary Formations of North America.* Conrad, like Audubon, was an artist. It has been said that some of the shells in Audubon's *Birds of America* were from the hand of Conrad. The *Fossil Shells* was beautifully illustrated by figures drawn on stone by Conrad. The *Marine Conchology* was hand-colored by his sister.

Although Conrad was born in Trenton, N. J. in 1803, his home was in Germantown, Pennsylvania, where he early associated with naturalists. His father was a publisher but was interested in natural history and was elected Professor of Botany at the University of Pennsylvania. Timothy, his oldest son, had a talent for drawing and learned lithographic engraving and type setting in his father's establishment. Although he learned the trade, such a calling did not suit the fancy of young Conrad's natural taste for the outdoors.

Timothy's great love for science as a boy earned him the presidency of a scientific society of youths. But it also was the cause of his name being dropped from the rolls of the Church of the Society of Friends. This punishment was inflicted for non-attendance at church and for taking walks on Sunday. Although his education did not consist of more than that obtained at private schools, he was taught Latin, Greek and French. At his father's house he became acquainted with Thomas Say and other scientists of the time. He early associated with members of the Academy of Natural Sciences at Philadelphia, to which he was elected a member in 1831. At this date he was considered the foremost authority on the Tertiary period of the earth's history of North America as well as a shell student of reputation.

At the Academy he studied the fossils found from New Jersey to the Gulf of Mexico, particularly those that had been brought from the famous bluff at Fort Claiborne on the Alabama River, Alabama. After studying the Claiborne specimens Conrad resolved to journey to the Fort to collect and study further the multitudinous fossils that were contained in the sands of the river bank. He had earlier examined the strata and fossils along the rivers of the coastal slope of Maryland and Virginia.

One hundred years ago, Fort Claiborne was one of the most important cities in the state. Today the site is marked only by a store, a cotton gin, a few houses and a new toll bridge over the river. In 1833, it was a city



CONRAD WAS A CONTEMPORARY OF AUDUBON
He devoted the major part of his life to the study of the fossils of the ancient seas of the South and East

of 2500 people and was a center of political, social and cultural activity. Three governors of the state came from Claiborne; General Lafayette on his visit to America honored the city and dedicated the New Masonic Hall. Brilliant and cultured gentlemen built their homes there. The steamers plied their busy trade in hauling cotton down the river and Claiborne was one of the important stops to pick up that vital product of the South.

At this point, however, the story changes from one of prosperity to one of sorrow. Fever and cholera wiped out the inhabitants. The buildings and streets went to ruin. But the natural phenomena that intrigued Conrad and other naturalists and geologists of his time and of the years following, increased in importance. The place that was so famous a hundred years ago that Sir Charles Lyell, the great geologist of Europe, made a special trip down the Alabama River and climbed the "365" steps up the bluff to collect in the sands of the bank, is still one of the world's famous fossil localities. The bluff, a mecca for naturalists, paleontologists, geologists, and shell collectors, will continue famous as long as there exists in the human makeup the instinct to study, collect and to observe at first hand the wonders of the natural world. Such field trips may be hazardous, ex-

pensive and hard for those who have the desire for knowledge, but this makes the goal that much more to be desired.

In December, 1832, his only resources being that of small subscriptions from members of the Academy of Natural Sciences at Philadelphia, Conrad set out to collect the shells of "clams and snails" that lived in the ancient seas, and of those that were living in modern times.

He was gone two years, travelling by sea to North Carolina, by stage and by foot through South Carolina, Georgia and Alabama. His finances always low, he was helped by funds from his friends in Philadelphia and by others made along the way. The happiest part of his trip was spent at Claiborne where he enjoyed the hospitality of Judge Tait and his family.

The fossils and shells of the recent mollusks collected in the two years provided material for years of description. Further numbers of the *Fossil Shells* contained the descriptions and beautiful lithographed illustrations of the shells from the Claiborne Bluff. In age they belonged to that oldest epoch of the Tertiary period called the Eocene. In 1838-45, Conrad published the *Fossils of the Medial Tertiary*. It contained the fossil shells from the next oldest epoch, the Miocene. Those fossils came from the river bluffs along the coastal plain from Maryland to North Carolina. These two publications in their original form are extremely rare. They are Conrad's best known works but were by no means his only efforts.

Although shy in character, avoiding crowds or public speaking, he was prolific with his pen. The result of his labors was a bibliography of 198 titles that include descriptions and discussions of living sea shells and of fossils from the states of the Atlantic, Gulf and Pacific slopes of the United States and from the inland states of Indiana, Colorado, Kansas, Wisconsin and upper New York. He also wrote on fossils from Syria, Liberia, Chile, the upper Amazon River and Peru.

Besides the study and description of marine life, Conrad collected and wrote extensively on the fresh water shells, particularly the fresh water mussels, Unionidae or Naides.

Conrad was handicapped by poor health. In the early part of his scientific career, he suffered through lack of funds, but this was changed through wise investments in his later life and he died with substantial wealth. Although Conrad was employed on many surveys and was connected with several scientific institutions, his salary was nearly always meagre. The single exception was in his capacity of geologist and later paleontologist to the first New York State Geological Survey, established in 1837. He was with the survey five years during which time he received $1500 a year. This was a fortune to him and it formed the basis for his later actual financial independence.

Physically, Conrad was not a handsome man. Despite his weak voice, he was a brilliant conversationalist and humorist. Although he had many warm friends, he had periods of depression during which he kept to himself. He destroyed all letters to himself and all records of his activities. Though he received many honors abroad, he never took the trouble to acknowledge them. He had a bad memory that, like Hamlet's father's ghost, would rise to haunt. Besides being a scientist, Conrad was a poet. Here his memory did not fail him. When on walks through the woods he would repeat long passages. He was fond of writing poetry but as he did not receive the praise he yearned for, this sometimes spurred him back to scientific writing. Some of his poems were published. A few he characteristically suppressed. Some still turn up in autograph albums, unpublished. Of his beloved Claiborne and friends there he wrote:

> "Sweet village, 'tis to thee a wanderer owes
> Friends, who respect a pilgrim to that shrine
> Which over earth new life and beauty throws
> And gilds the rugged chambers of the mind."

In Schoharie, New York, he wrote philosophically to a fossil, the trilobite:

> "The race of man shall perish, but the eyes
> Of Trilobites eternal be in stone,
> And seem to stare about with wild surprise
> At changes greater than they yet have known."

Conrad never married, but his longing for a home is expressed deeply in many of his poems.

He died at the place of his birth, Trenton, New Jersey, on August 8, 1877, and there he was buried. He was one of a band of remarkable scientists of the Academy of Natural Sciences at Philadelphia that included Say, Rafinesque, Vanuxem, Morton, Lea, Troost, Harlan, Audubon and Nuttall. As his nephew, the well-known naturalist, C. C. Abbott, wrote, he was the "last of that prominent group".

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WITCH HAZEL

By LOIS COLLINS

That branch which bends to hidden springs,
Now blooms when all is bare.
Its yellow tangles gleam through woods
Grown leafless.
When air is crisp
And days are short
And winds hum plaintive lullabys
To laggard ferns and flowers,
'Tis then Witch Hazel smiles through yellow eyes
And cheers the Year's last hours.

A Bouquet for Your Microscope

By JULIAN D. CORRINGTON

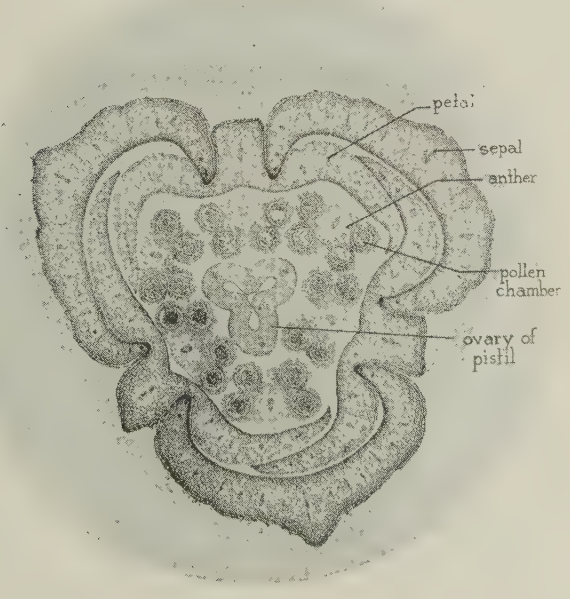
Photomicrographs courtesy Bausch & Lomb Optical Company

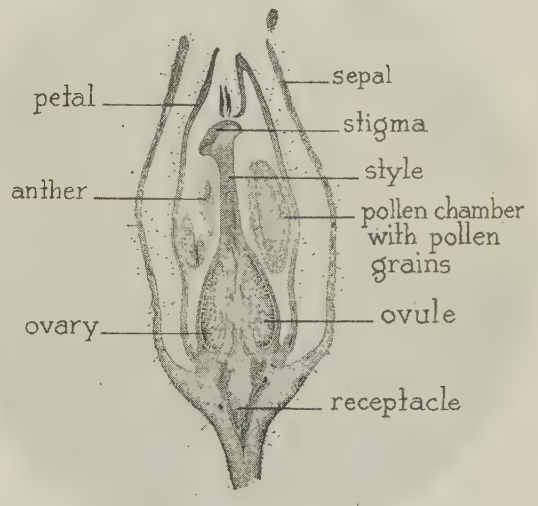
BIRDS, butterflies and flowers, probably more than anything else, elevate us to a better appreciation of Nature in the warmer seasons. After a long and severe winter we look with great eagerness for the first song sparrow; that venturesome, flitting mourning cloak; and the earliest trillium. Summer brings these outdoor jewels in profusion; Autumn brings them in a riot.

For those who enjoy looking behind the scenes or under the surface, a search for the factors responsible for the beauty of these living gems will provide a series of interesting sessions with the microscope. Bird feathers and butterfly wings each disclose, when so inspected, the causes for all the gorgeous coloration that they exhibit. So it is with flowers, the ingenious construction of which, along with their profusion of striking hues and patterns, reveal the reasons for their existence.

Two of the accompanying illustrations are labeled to explain the parts of a flower, terms familiar to students of the outdoors but useful here by way of review. It is an easy matter to dissect the parts of a typical, simple flower, such as a buttercup or lily. The entire flower is borne on a receptacle, crowning the end of a stalk, and the first ring or layer of parts to be peeled off is the calyx, consisting of a number of sepals. These are green and leaf-like. Remove them, one by one, and lay them aside in a single row. Next comes the corolla, made up of separate (as in the buttercup), or fused (lily) petals, also leaf-like, but highly colored and giving the characteristic appearance by which the particular flower is known: yellow in the buttercup, white in the lily.

Removal of the petals exposes the full extent of the





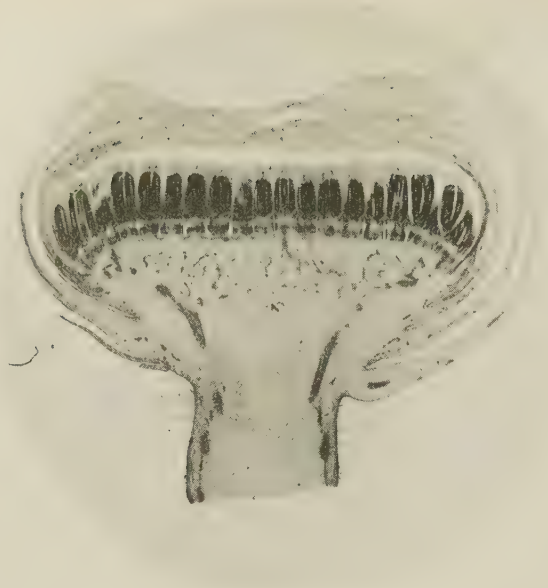
THE TOBACCO FLOWER UNDER THE MICROSCOPE
This is a vertical cut showing the various parts of this representative flower

members of the next row, the stamens, and after these are stripped off, the last remaining element, the pistil, is seen.

Studies made of young flower buds clearly indicate that the flower is composed of modified leaves, a statement that is quite evident in the case of the sepals and petals, but is less plain in the highly modified stamens and pistil. Comparative studies of many different types of flowers, however, especially of their developing stages in the bud, prove that the statement is correct.

Microscope slide whole mounts of these dissected flower parts are not at all difficult, and they may be mounted separately or all together on one slide. Each object is passed through a graded series of alcohols of increasing strength, as 50%, 75% and 95%, cleared in anilin oil, carbol-xylol or turpentine, and mounted in balsam. A ten minutes' stay in each chemical is ample. Free-hand sections are best made with a safety-razor blade mounted in a carrier or handle, an inexpensive appliance now available in many stores, and are simple to cut after a bit of practice. Both razor and flower bud should be dampened with water during the cutting, which should be either straight across or longitudinal, oblique slices being avoided. They should be made

LILY BUD CROSS-SECTION
Slide mounting for microscopic study, as explained in the text, is not at all difficult



VERTICAL CUT OF DANDELION HEAD

The separate developing florets are revealed in this 12-diameter magnification

as thin as possible and of uniform thickness; wedges are unsatisfactory. It will be found that such relatively soft parts as flower buds can be sectioned far more easily than stems or roots.

Whole mounts of stamens, pollen and stigmas, and both cross and longitudinal sections of ovaries are also interesting. Pollen, the fertilizing, microscopic element produced in the anthers of stamens, is of great significance in connection with studies on the various hay fevers that they cause.

If different pollens are observed beneath a lens, certain characteristics will claim attention. Why is this kind of pollen sticky? Why is this one spiny? What are these wing-like projections on this specimen? To find the answers to such questions, consider the function of pollen and what it does to fulfill its mission. Each pollen grain is a tiny plant, designed to be transported by water, wind or insect to the stigma of another flower of the same species, there to germinate and consummate the vital function of reproduction. As far as the pollen grain itself is concerned, its duty is that of travel—to attain the stigma.

Spiny and moist or sticky pollen at once suggests insect carriage; dry, smooth and winged pollen grains, transportation by wind. Thus the method of pollination often may be determined by mere inspection under the microscope. As is well known, the showy colors and lovely perfumes of many flowers are provided for the use and seduction of insect visitors and not to charm mankind or inspire spring poets. One of the most striking proofs of this fact is found in the many kinds of evil-smelling blossoms, adapted to attract carrion-feeding insects.

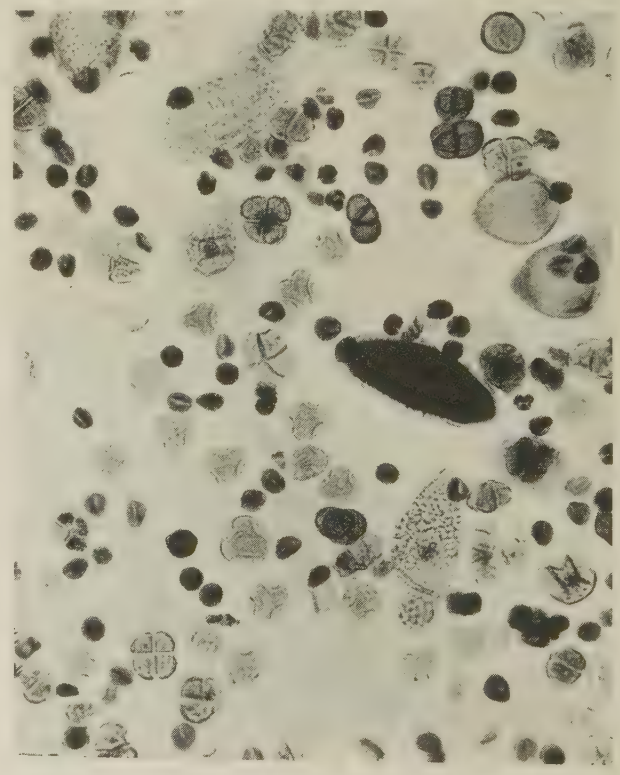
VARIOUS TYPES OF POLLEN GRAINS

The diversity of pollen structure can be seen in this photomicrograph. Magnification nearly 200 diameters

Seek out some wind-pollinated flowers for comparison with the commoner insect-pollinated types, and make corresponding micro-slide mounts of their parts. The attributes here will be absence of showy petals and fragrance; large, elevated and often rough or feathery stigmas for easier and more certain lodgement of pollen; and a superabundance of anthers and pollen, freely elevated and displayed when ripe, so that great clouds of this fine, living dust may be caught up by every passing breeze. Wind-pollinated trees produce flowers early in the spring before the leaves unfold. A tree in full leaf would offer great obstruction to this type of pollination. Examples are grasses, ragweeds, oaks, poplars, elms and pines.

Among flowers pollinated by animals, those catering to insects comprise the vast majority, though slugs do a bit of this work and birds even more, as in the familiar case of the hummingbird and trumpet creeper. Botanical texts are full of intriguing descriptions of the elaborate and ingenious adaptations on the part of both flower and insect, by means of which a particular species of flower will attract and feed a definite species of insect that alone can effect cross-pollination.

Many of the points of flower classification used in botany can be exemplified to advantage by free-hand sections for slide mounts. There is the matter of the attachment of the floral parts in relation to the pistil, for example. When all the other elements—sepals, petals and stamens—spring from the receptacle below the ovary, the flower is said to be hypogynous (below, ovary), as in the lily, trillium or tomato. When these parts are attached half-way up on the ovary, the flower is perigynous (around, ovary), an example of which is the cherry, and when the attachment is completely above and enclosing the ovary, as in the gooseberry or cucum-



ber, the flower is epigynous (upon, ovary). Longitudinal sections are excellent to demonstrate these conditions.

Again, the method of attachment and the arrangement of the ovules in the ovary, termed the placentation, is important. Both methods of sectioning are useful here.

Finally, there remains to be mentioned the peculiar and highly specialized flower modifications characteristic of the great family Compositae, prominent examples of which are the daisy, sunflower and dandelion. What we think of as the flower or head is in fact not a single flower at all, but a great cluster of tiny, individual, imperfect flowers, aggregated into a head. Observe the photomicrograph of a dandelion head, reproduced herewith, and note the small separate flowers. In the daisy the so-called petals are really separate flowers, termed ray flowers, while the head proper is composed of a multitude of disc flowers. Microscope whole mounts and sections are vastly interesting and make the structure of these features clear.

Nothing is more amazing, if you have the skill and patience to make the necessary slides, than the examination of minute flowers of the various grasses. Good subjects are easily found. Wheat, for example, has a flower of great beauty, observation of which is limited to him who goes bouquet collecting with a microscope.

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A Fantastic Cypress Knee

By HUGO H. SCHRODER

CYPRESS trees send up peculiar growths from their roots known as "cypress knees." When summer rains fill the swamps, these knees reach above the water level and seem to act as breathing organs to carry air to the submerged roots. In dry seasons, most of this growth is exposed to view. The ordinary type of cypress knee is cone-shaped or rounded, but others of more fantastic shapes occasionally are found.

A Graflex slung over my shoulder, field glasses in one coat pocket and lunch in the other, I set out one day for a hike through Florida pine woods and cypress swamp land. In a region known as the "six-mile cypress" I found a fantastic cypress knee that carried me back to the days of my youth and tales of gnomes, elves and hobgoblins.

My camera was brought into action, and when a print was finally made from the negative, I found a figure of a woman, holding a child in her arms, plainly visible at the upper left side of the cypress knee. The face of the child is very gnomelike. The topmost figure resembles a bear. A number of other grotesque figures may be seen in other parts of this odd growth.

This cypress knee was about three feet in diameter and about half that high. It was found during a prolonged dry spell, when every part of the swamp was dry and the entire growth of the knee could be seen.

THE CYCADS

A group wide-spread over the earth during the Carboniferous Age, but now confined to tropical and sub-tropical regions

By F. LYLE WYND

Photographs by Donald Hetler

WHO would think that the larger members of the plant group known as cycads and commonly seen in greenhouses were relatives of the familiar pine and fir? They look so like palms that their true nature is unsuspected until one examines the fruiting structure or strobilus, for it is only by a comparison of the fruiting structures of plants that their true relationships are revealed. The strobili, or "cones" of the cycads are remarkably like those of the pine. Cycads are gymnosperms, which means "naked seed", and this indicates the character that unites such diverse plants as the pine, juniper and the ginkgo with the cycads. In all these plants the seeds are borne on the surface of a specially modified leaf called the sporophyll and are exposed to the outside world, while the seeds of all other plants are enclosed in a hollow sac-like cavity called the ovary.

Supplementary illustrations for this interesting article on the cycads, a once dominant group that has all but disappeared, will be found in the rotogravure section

There are only a few cycads living on the earth today, but in the distant geological past they have had a mighty and illustrious history. They are the only living representatives of the great group, Cycadophyta, which is now becoming extinct.

The earliest fossils of the cycadophytes are found in the Devonian strata, far down in the sequence of geological horizons. It was in Devonian times that the first land plants appeared on the earth. The sediments that formed the impression of their leaves and even preserved part of their actual organic structures were laid down about 350 millions of years ago and were overlaid by 174,000 feet of later sediment! Had the surface of the earth not been crumpled and tilted and the great humps and folds had not been eroded away, we would never have known what kinds of plants were entombed thirty-four miles below.

About sixty years ago a disastrous flood occurred in the Catskill Mountains. Near Bilboa the torrent exposed a number of erect fossil trees. In time these fossils came to the attention of scientists, and were identified as members of the genus *Psaronius*, a group of ferns that became prominent much later in the Carboniferous Age. Later these specimens were shown to be members of the Cycadophyta.

SHALE FOSSIL

Callipteris raymondi, a member of the Cycadofilicales (late Permian Age) from the hermit shale of the Grand Canyon. Photograph by Carnegie Institute of Washington.

European scientists call these early plants Pteridosperms, or "seed bearing ferns" because their leaves were so like the ferns, but American students of the gymnosperms usually call them Cycadofilicales meaning "fern-like cycads", and if the reproductive features are stressed, this is the more appropriate term.

In the Carboniferous times, these fern-like cycads became the dominant feature of the flora and their dead bodies built up many of the coal measures. For many years the impressions of their leaves in the coal measures were thought to be those of ferns and for this reason the Carboniferous Age is frequently called the "Age of Ferns" when in reality it should have been called the "Age of Fern-like Cycads". The fern-like cycads reached their greatest development in the later part of the Carboniferous Age known as the Pennsylvanian, and an immense amount of fossil material has been obtained from the Pennsylvania coal measures. Some of the finest specimens of these early fern-like cycads occur embedded in calcareous nodules called "coal balls" which are scattered through the seams of coal.

Although individual fragments may be so well preserved that an intimate knowledge may be obtained concerning the structure of the cycad, it has proved a difficult task for the paleobotanist to relate these fragments with each other. This has caused many fossil specimens to be described under different names when in reality they were fragments of plants of the same species.

The most remarkable instance of a reconstruction of a single species from fragments of supposedly different species was begun by the paleobotanists Oliver and Scott. Fossil seeds, stems, leaves and roots that had been given different names were found to be parts of one species. The species became, and yet remains, the most

thoroughly known of any Carboniferous plant—but what should it be named? It was wisely agreed to drop all the names previously applied to the separate parts and give the assembled species a new name, *Lyginopteris.*

But these fern-like cycads were to have a short life geologically. In the course of 150 millions of years they became the dominant feature of the earth's flora, but within another 100 million years, they became extinct in the late Triassic or early Jurassic Age. Even towards the end of the Carboniferous Age, the fern-like cycads were diminishing in importance, but the group was still plastic in the evolutionary sense and by the beginning of Permian times it had given rise to two other groups closely related to it, the Bennettitales and the Cycadales.

The Bennettitales differed from the parent Cycadofilicales, or fern-like cycads, in their female structures. The female leaves lost all resemblance to leaves and were grouped in a cone, much as in the living cycads, but the male structures were still borne on leaf-like forms. The Bennettitales, like their parents, were to have a short life geologically, for they became extinct during the Cretaceous Age, about 150 million years after their inception.

Developing side by side with the Bennettitales were the Cycadales. This group bore both the male and female structures on leaves that had lost their leaf-like character and were in each case grouped into cones like our modern gymnosperms. Throughout the Mesozoic Age, the Cycadales were such an ascendent feature of the flora that it has been called the "Age of Cycads" and yet today they are limited to a few species tucked away in the most inaccessible spots of the earth.

A FERN-LIKE FOSSIL

The beautifully preserved fossil leaves of the species, *Lyginopteris oldhamia,* are largely responsible for the Carboniferous Age being known as the age of ferns. A more nearly correct name would be "the age of the cycad-like ferns". Photograph by University of Chicago Press

The silicified trunks of fossil Cycadales are among the most durable of all fossils. Since ancient time they have attracted attention. More than 4000 years ago some loving and sorrowful hand placed a finely preserved specimen on a tomb in the Necropolis at Marzabotto in Italy, where it was found in 1892 and described as *Cycadoeidea etrusca.* For some one hundred years, the miners of the great Iron Belt of the Potomac formations between Baltimore and Washington have collected these fossils in the vicinity of their labors and preserved them about their homes as curiosities.

The most important American localities for fossil cycads occur in Maryland, in strata of the Potomac formation; in the Black Hills of South Dakota and Wyoming; in the Freezeout Hills of Carbon County, Wyoming; and in the Grapevine Valley of Colusa County, California. Dr. Wieland, the greatest student of American fossil cycads, became so interested in the fossil-bearing area of South Dakota that he took out a claim of 360 acres in order to prevent its needless destruction. Later, he was successful in having the area made into a national preserve.

Fossil remains of the Cycadales are less common than of the Cycadofilicales and the Bennettitales, probably because their reproductive structures decayed more easily, and thereby lessened the probability of their fossilization. In the absence of reproductive structures, the fossil leaves are scarcely distinguishable from those of the Bennettitales and consequently many leaf specimens referred to the Bennettitales may in reality belong to the Cycadales. The fact that the living representatives have come down to us almost unchanged for so many millions of years partly makes up for the comparative lack of their fossil remains. They are truly "living fossils".

During the Mesozoic, they were world-wide in distribution, and they have given the name "The Age of Cycads" to this great period in the Earth's history. But today there are only sixty-five species distributed in nine genera. These living fossils are restricted to small areas, and are limited to a few localities in tropical and subtropical regions. One's interest in the specimens seen in greenhouses and botanical gardens is increased with the realization of the great labor and care that made their transplanting from such distant and inaccessible regions possible.

Of the nine living genera, four belong to the western half of the earth and five to the eastern. Mexico and the West Indies contain most of the living specimens of cycads. Mexico contains the genera *Dioon, Ceratozamia,* and *Zamia,* and Cuba contains *Zamia* and *Microcycas.* Australia has *Macrozomia* and *Bowenia* and *Cycas. Cycas* extends beyond Australia to Japan, India and Ceylon. *Encephalartos* and *Stangeria* are restricted to South Africa.

The largest cycads may grow sixty feet high. These larger species look very much like palm trees. The smaller types may have stems only a few inches long, in which case the crown of leaves gives a fern-like appearance to the plant. *Stangeria* has leaves so like the true ferns that it was classified with the genus *Lomaria* for many years.

Finally this supposedly *bona fide* fern was found bearing cones!—and *Stangeria* became its new name. If botanists confuse even living cycads with the ferns—how much more excusable does it seem that the profusion of fern-like leaf impressions of the coal measures gave the geologists the belief that this was the "Age of Ferns".

The tree-like forms differ fundamentally from the trees most generally known in the structure of the trunk. In most species there are no growth rings. In a few types, rings are formed as in modern trees, but in no case do they represent annual growth rings. In *Dioon spinulosum,* rings are formed every second year. The physiological stimulus that causes the plant to put forth a new crown of leaves also stimulates the stem to form new cells, producing a new growth ring. In other types, as *Dioon edule,* the production of a new crown of leaves does not coincide with new growth in the stem. Only at the end of prolonged rest periods does the appearance of new leaves accompany the function of a growth ring in the stem. The rings may thus appear only at intervals of ten or even twenty years.

AN 85-POUND CYCAD CONE

Although the leaves of cycads resemble those of ferns or palms, the structure of the cones shows clearly the relationship of the cycads to the more familiar gymnosperms. This is a mature female cone of *Macrozamia denisoni* and is from a photograph by Miss Hilda Geissmann taken near Brisbane, Australia.

PHOTOGRAPH, COURTESY UNIVERSITY OF CHICAGO PRESS

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The Huia—Strange Bird of New Zealand

By EDITH M. LAING

NOTED FOR its many interesting birds not found elsewhere, New Zealand has found no better medium for advertising them than by placing their pictures on postage stamps, where all may study them.

The birds shown on the accompanying stamp (enlarged) are a pair of huias. The musical common name bestowed by the native Maori, whose liquid tongue pronounces each vowel, is supposed to represent its call. The scientific name of this remarkable bird is *Heteralocha acutirostris.*

Seeing a pair of huias for the first time, a stranger might easily take them to be two different species. The male has a sharp and powerful bill, while that of his mate is long and flexible, and is gracefully curved, like a scimitar. One might almost expect it to function like an elephant's trunk, to pick up the food and pop it into a mouth somewhere in the background.

But Nature has a good reason for this astonishing dissimilarity in bills, for when it comes to foraging, the birds are perfectly equipped for teamwork. The male probes into the promising burrow of an unsuspecting grub, resting in decayed wood, or beneath the bark of trees, and after patiently enlarging the passage-way, rests from its labors. The sickle bill of the female then goes into action, its flexibility permitting it to explore any secret passages that branch off from the main tunnel. Finally, up it comes triumphant with the wriggling dinner for two.

Among many primitive races feathers are used for decorations, no doubt partly for their ornamental value, but possibly to represent birds that are supposed to bring messages from the gods. In early days, the intricate geometrical designs tattooed on the bronzed face of a stalwart Maori chief were always set off by a white-tipped tail feather of the huia, worn in the head-band as an insignia of nobility.

The huia has long been numbered among the many remarkable birds that New Zealanders are trying to preserve.

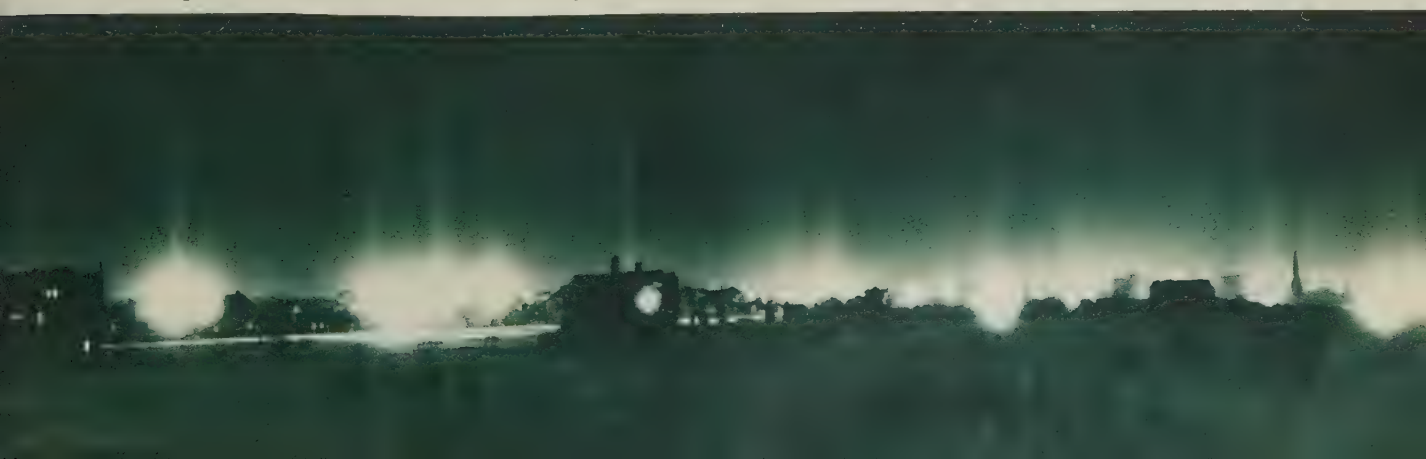
Atmospheric Optics

By C. F. TALMAN

In the chronicles of the middle ages are recorded many cases in which "signs" are said to have appeared in the sky. These were supposed to be of portentous significance. Today we can identify most of the "signs" described by the chroniclers with well-known and well-understood natural phenomena, a majority of which are optical.

The field of atmospheric optics is rich in interesting manifestations, including some that are very striking and some that are extremely rare. Dozens of forms of halo have been classified—all due to the presence of ice particles in the air. A "halo complex," in which several varieties of solar or lunar halo are seen at once, is the sight of a lifetime. There are many types of rainbow, to which category belong fog-bows, spray-bows and dew-bows. Mirage occurs in numerous forms. The corona (not the kind seen during a solar eclipse), the glory and the Brocken spectre belong in this field. So do the green flash at sunrise and sunset, and the spectacle of the "sun drawing water."

The rainbow is the most common of these various phenomena. In the first picture on this page, taken by G. A. Clark, note that the sky, as usual, is much brighter inside the bow than outside. Below is a man-made Aurora Borealis, formed in an ice laden atmosphere over the street lights of Saskatoon, Saskatchewan. Photograph by B. W. Currie. All photographs reproduced by courtesy of the United States Weather Bureau.



Spray bows at Niagara. These are rainbows formed in the spray of cataracts, waves or even lawn-sprinklers, and usually are more vividly colored than those seen in the sky. Courtesy of General Electric. The ring around the sun is known as the "halo of 22 degrees," and usually escapes attention because of the sun's dazzling brightness. Photograph by F. Quénisset, courtesy of Jacques Boyer.

The unusual phenomenon of the sun and the undersun is shown at the left, photographed from the summit of the Zugspite, in Germany. The dazzling image of the sun reflected on the upper side of ice clouds can be seen only from high mountains or aircraft. Courtesy of Bayerische Landeswetterwarte. At right is a sun pillar in the Alps, caused by the reflection of the sun's rays on ice crystals in the air. Photograph by H. H. von Halban.

The Beaver—Construction Engineer

Photographs by Charles Macnamara

The hardworking beaver is one of our most interesting mammals. An important part of the life work of a family involves the damming of a stream, and keeping the dam in repair that they may make their home in the resultant pond. Near Arnprior, Ontario, a colony of beavers lived for 14 years, moving away only when the food supply was cut out. The pictures on this and the two pages following are only a small part of a collection made by Mr. Macnamara, who visited the colony weekly during the entire period of their occupancy. The dam shown above is the largest of the six principal dams built by this colony. It measured 400 feet long

and for a considerable distance was six feet high. The notched log illustrates how the beavers go about cutting trees into convenient lengths in order that they may be floated to the pond.

When the wood near the pond was gone, the beavers found it necessary to dig a canal for transportation of the logs from the edge of the woods to the stream. In the picture above we are looking "down" the canal to the stream, which can be seen in the background. For convenience of transport, a thick trunk was cut in pieces as short as two and one-half feet, while slender tops were left as long as ten feet.

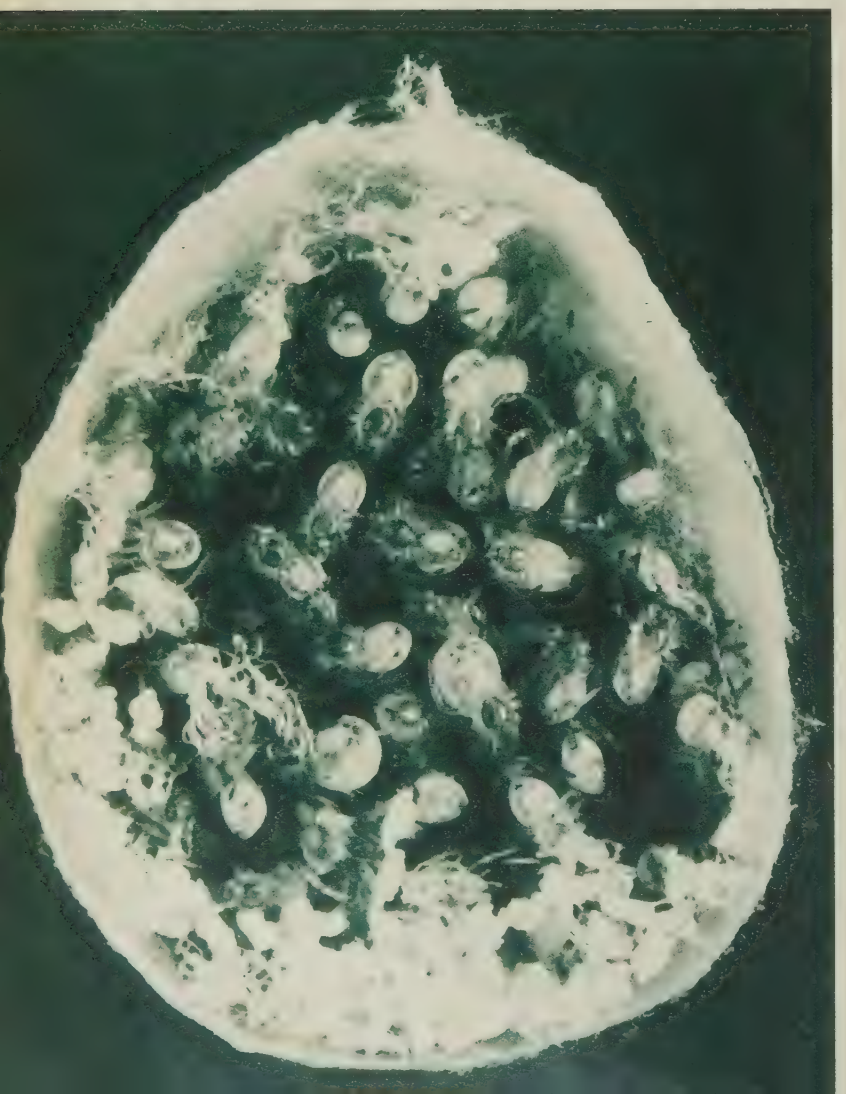
In summer the beaver is safe from marauding land animals, as his home, like a moated castle, is protected by the water surrounding it. In winter, however, it can be reached over the ice of the frozen pond. The beavers know this, so each season at the end of October they begin to cover their home of sticks with a thick layer of mud. They work intermittently, but by the end of November, when severe cold arrives, a coating from six to ten inches thick has been applied. The wet mud, reinforced by the sticks, freezes into solid masonry impenetrable by any animal except man, and even he finds it difficult to break through ten inches of icy ground. In summer, a typical beaver dam is a bank of earth reinforced with brush. The downstream slope is covered with a thick layer of branches to prevent erosion by the rivulets that run over the crest here and there.

The last photograph shows the beaver's footprints in the slush of shelf ice, taken early in December before the stream had frozen over completely. A cage trap that catches beavers unharmed, patented by the U. S. Department of Agriculture, has helped us to learn many interesting habits of beavers hitherto unknown even to students of these mammals.

The Black Widow Parasite

As Photographed by George Elwood Jenks

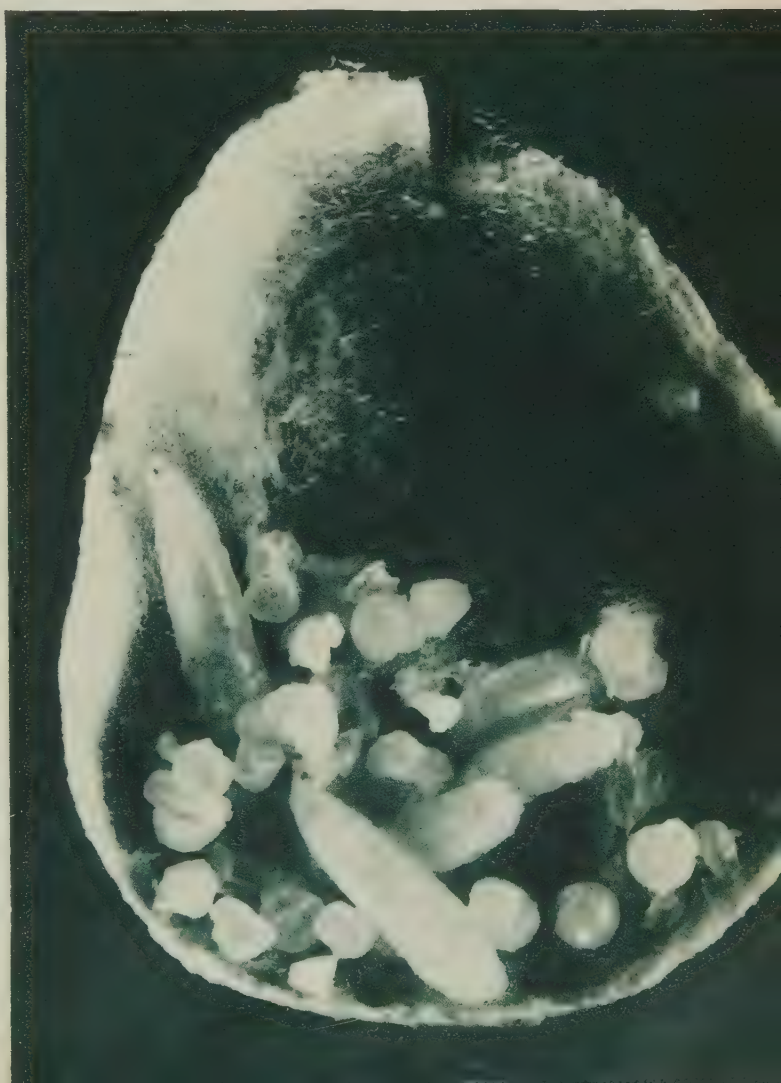
Supplementing the series of pictures on the black widow spider that appeared in the August rotogravure section, we present this month the story of *Gaurax araneae,* the "lost" parasite of the Black Widow. It was first discovered in Los Angeles about 40 years ago, but apparently was forgotten by science until Mr. Jenks found it again in the egg sacs of the spider. Nature has checks on the undue increase of many creatures in the form of parasites. It is a tiny fly, *Gaurax araneae,* that controls the Black Widow. However, this spider, perhaps assisted by settlement, has been increasing in numbers in certain sections of the country, despite the activities of *Gaurax*. Mr. Jenks believes that laboratory propagation of this parasite is the real course to follow in checking the increase of the spider.



Above is the familiar Black Widow, with her tiny mate approaching to fertilize her eggs. These will be laid in a sac constructed from silk from her spinnerets. Here is shown an egg sac, opened soon after the eggs have hatched and full of baby spiderlings. In the course of three or four weeks these young spiders, having grown and moulted and assumed some of their characteristic markings, have become strong enough to gnaw their way out through the walls of the sac.

But all may not have gone so well with the widow's numerous family. Although she has been on guard almost constantly during the weeks of incubation, it sometimes happens that the rare and tiny fly, here shown, greatly enlarged, may have eluded her watchful eyes, and succeeded in laying her own eggs on the surface of the sac. These eggs soon hatch and the tiny maggots, provided at birth with instinctive knowledge, at once bore through the tough walls to feast on the pearly spider eggs within and so develop in fulfillment of their own destiny.

Soon nothing is left of the spider's treasure except a mass of debris, in which repose the bandit maggots, ready to pupate in the wrecked nursery of the spider host. Below is shown a section of the egg sac with some of the *Gaurax* eggs adhering to the silken surface. Some of these eggs have already hatched and the maggots are preparing to bore their way into the sac, already unwillingly provisioned by the Black Widow. In the other picture, still more enlarged, are shown several of the young flies ready to pupate.



The photographs above show how the interior of a sac appears after it has been plundered by the parasite. Sometimes the larvae are not numerous enough to devour all the eggs, and a few of the young spiderlings survive. After a week or two the cocoons of the transforming pupae split open and the adults emerge to hurry away and find other sacs to destroy. These pictures well illustrate the appearance of both larvae and pupae. Below are shown several adults on an egg sac together with some of their eggs.

Mr. Jenks has experimented extensively in attempting to propagate this parasite, and he has succeeded in raising several thousand under artificial conditions. At present the main problem is the preparation of synthetic food for the larval flies that will substitute for the egg sacs of the spider. When this problem is solved, Mr. Jenks believes it will be possible to propagate the parasites in insectaries by the million for widespread distribution and thus check the increase of the Black Widow.

Nut-bearing Trees

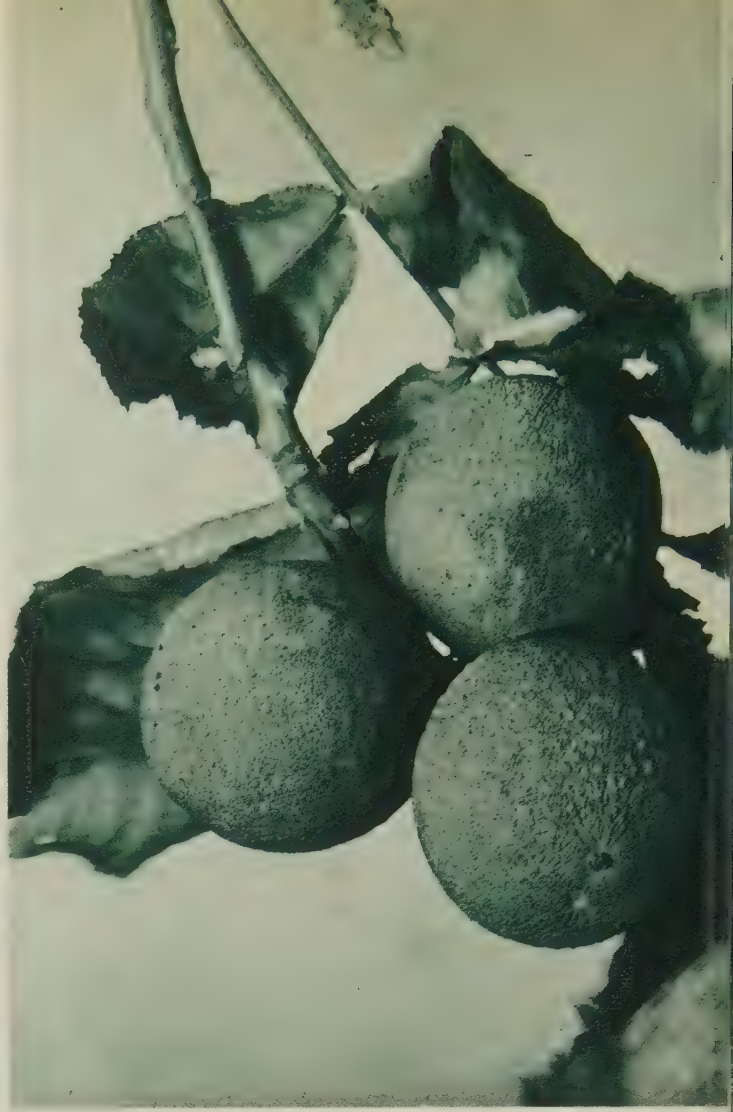
Photographs by
L. W. Brownell

In early geological times hickories grew in northern Europe, and in America as far north as Greenland. Apparently the ice age exterminated all except those that had room to retreat far south before it. So it happens that we in America have all the hickories.

Among the species furnishing the best wood is the mockernut, *Hicoria alba.* It ranges from southern New England to eastern Nebraska south to Florida and Texas. Its fruit is among the most prized, and is a favorite food of the gray and fox squirrels.

With a range much like that of the mockernut, the bitternut or swamp hickory, *Hicoria cordiformis,* extends a little farther north along the low valleys of our northern states, thus conferring the benefit of its wood on a few more tillers of stony acres. The compound leaves, with from seven to eleven leaflets that suggest those of the willow, are yellowish green above and pale beneath.

Among all the hickories (and they are found only in North America) none, perhaps, excel in general usefulness the shellbark or shag-bark hickory, *Hicoria ovata.* It is the easiest of all our species to identify, for its rough shaggy outer bark hangs in loose strips that are periodically shed. The wood is of the best quality and the nuts superior to all others of the group.



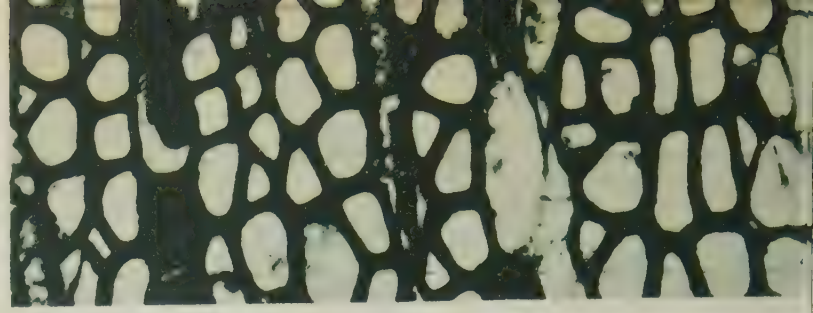
Above are two natives whose fruit have gladdened the hearts of many Americans, red and white. The white walnut or butternut, *Juglans cinerea,* grows from southern New Brunswick westward through southern Quebec and southern Ontario to southern North Dakota, and south nearly to the Gulf of Mexico. The Indians prized the rich meat of its long, rough-shelled nuts, and the early settlers made their butternut dye from its bark.

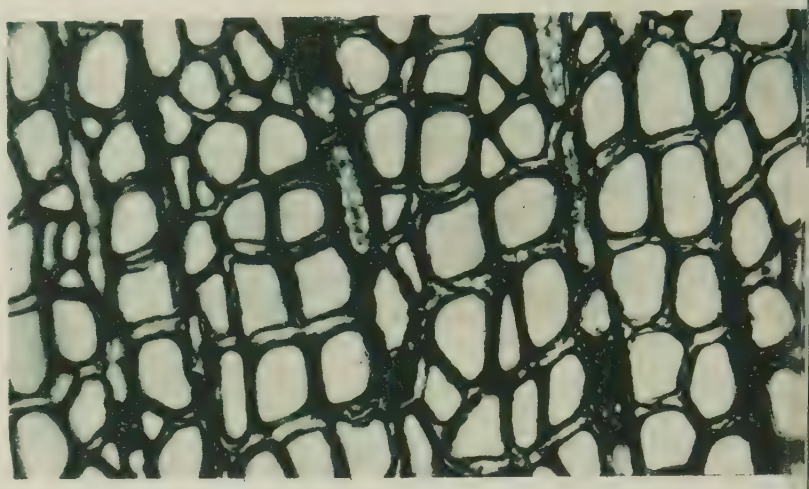
Slightly more restricted to the northward than the butternut, the black walnut, *Juglans nigra,* ranges south nearly to the Gulf. The spherical nuts are borne in bunches, and as the tree is still fairly common, they are to some extent an article of commerce. The wood of the black walnut is especially suitable for certain articles of furniture and cabinet work and especially for gunstocks. The demand for these purposes has resulted in the destruction of most of the older trees.

The horse chestnut is widely planted as an ornamental tree in many parts of our country. It is a favorite from its beauty of leaf and flower. The nuts are inedible and seem to be of service principally to young America who is fond of fastening two or three together in imitation of the bolas of the South American natives.

When the chestnut blight, imported from China, threatened to destroy all our splendid groves of native trees, it brought sadness to more homes than probably any other tree news ever heard. There never was a tree more beloved of the young people of America than this forest citizen, *Castanea dentata*. Thousands of men and women brought up in its wide range remember the delights of nutting on crisp autumn days and bemoan its passing. Although some of the old trees retain enough strength to send out a few sprouts and even to produce fruit in small quantities, the hope of its recovery almost has faded. The chestnut is one of the largest of our forest trees; a specimen whose trunk measured 17 feet in diameter has been recorded.

The American beech, *Fagus grandifolia,* is, next to the chestnut, dearest to the hearts of the people of our eastern states. Hardy, opening its leaves in early spring, graceful in its bearing, furnishing sweet fruit to man and forest dweller, ornamenting the autumn woods with russet foliage, it is indeed a friend of those who remember the nutting parties when young people raked the leaves to gather the three-angled nuts before the chipmunks and mice got them all. Perhaps, as they searched, the boys wore suits colored with the bark, for this tree shared with the butternut the honor of furnishing household dyes.





THE CYCADS

The pictures on this and the next two pages are published in conjunction with the article in this issue by F. Lyle Wynd. The photographs are by Donald Hetler. Above are magnified sections of the fossil wood of *Cycadeoidea*. The fine state of preservation of these specimens permits their cellular structure to be studied in great detail. Below are the fossil specimens from the Piedmont-Black Hawk section of the Black Hills, South Dakota. Other American localities in which specimens are found are Maryland, Wyoming and California.

The Missouri Botanical Garden is the home of many of our modern cycads. Above is *Dioon edule* from Mexico, where the seeds are used for food, and *Encephalartos caffer,* from South Africa. *Zamia vanhoutei* is pictured at the right. This is a female plant having cones about four inches long.

The last photograph is of *Supaia thinnfeldioides,* a cycadofilicales fossil found in the Hermit Shale of Grand Canyon. The close resemblance to fern leaves is apparent. This species is among the latest to survive of this long extinct group, and occurred during late Permian times when the Bennettitales and the still existing Cycadales were already established.

These fossil impressions formerly led scientists to believe that the plants whose remains mainly contributed to the prehistoric ooze that formed our coal fields millions of years later were ferns. It has now been established definitely, however, that these fern-like cycads were the dominant feature of the flora of the Carboniferous age.

On this page are other cycad specimens growing in the Missouri Botanical Garden. They are, left to right, *Zamia loddigesii,* from Mexico; *Zamia furfuracea,* also from Mexico but called sago palm in Jamaica; *Cycas revoluta,* a specimen from Japan; *Cycas beddomei,* from the Malay peninsula; the male *Zamia vanhoutei,* and *Encephalartos lehmannii,* from South Africa. Studying these is like turning back time.

African wild life, because of its beauty and abundance, continues to hold the interest of people the world over. The fine photographs on this and the next page were taken by Hugh S. Davis, well-known conservationist and photographer, of Tulsa, Oklahoma. The fine herd of zebras is caught in a reminiscent mood on the veldt in Kenya, British East Africa. Their calm indicates a feeling of security.

The portrait of the fine old gray parrot from the Belgian Congo reminds us of Polly of the bird stores. This species is a favorite because of its aptitude for conversational effort and its ability at imitation.

Hornbills, which have become famous the world over from the habit of imprisoning the female during the incubation period, are found in the tropical parts of Africa and southern Asia. This picture of the crested hornbill was taken by Mr. Davis in British East Africa.

The sleepy-looking African lion, with his mate in the background, was photographed in Tanganyika, Africa, as they enjoyed an afternoon siesta. It would be just as well not to presume too much on the gentle appearance of this royal pair, harmless as they seem here.

★ Conservation ★

A section of Nature Magazine devoted each month to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

ARTHUR NEWTON PACK, *Editor*

THE VOTERS AND CONSERVATION ★

On November third the American people will go to the polls to elect a President of the United States. In this election the American Nature Association has no partisan interest. Its members represent all shades of political opinion. The Association's main concern in the election is how the continuation of the present administration or the substitution of a new one will affect the conservation of the renewable natural resources of America.

So far as the probable conservation policies of a Landon administration are concerned we have little or nothing to go on. A general sentence in the Republican platform indicates an interest in conservation. The attitude of the Harding, Coolidge, and Hoover administrations toward real conservation left a great deal to be desired. If Mr. Landon should be successful we trust that he will not be content with their record of inaction.

During the Roosevelt administration we have heard much "talk" about conservation. The word has become a part of the vocabulary of millions. Its real meaning, however, remains as indefinite as ever. We believe that its trends are becoming more and more influenced by politics. In part because of this we believe that during the past three years many activities carried on in its name have been inimical to real conservation. We feel that at this time it is only fair to consider some of these things irrespective of whoever is to be responsible for the care of our natural resources during the coming four years.

One of the outstanding activities of the Roosevelt administration in the field of conservation is the Emergency Conservation Work known popularly as the CCC. Born of a desire to take unemployed young men off the streets and to give them healthful work that would influence their lives at an important period, this social experiment has been successful. It has, quite probably, become a permanent feature. As a contribution to conservation, however, the CCC has not been an unmixed blessing. Much of the work done has been at an excessive cost; possibly this defect may be balanced by the social benefits derived. But, of more importance in the present discussion, much of the work has been detrimental to conservation. Roads have been built leading to regions that should never have been opened up, but protected in the interests of wildlife conservation; cover and food necessary for wild birds and mammals has been destroyed under the guise of cleaning up the forest; ill-advised poisoning campaigns against predators and rodents have been conducted on a large scale. Even National Park areas, in many instances, have been combed and brushed like city parks.

Such activities are not the fault of the CCC, but are chargeable to the lack of consideration given to the programs and lack of coordination of the various so-called conservation agencies. These faults can and must be remedied if this work is to go on as a part of our national conservation program.

Other relief work has resulted in many travesties of true conservation—indiscriminate road building, civilization of areas that should have been left wild, drainage of marshes important for the nesting and feeding of birds, poisoning campaigns and the like. The necessity for providing work in a hurry has been the excuse. Our natural resources have been the victims of this haste. Work relief money has been made available to many existing agencies in amounts that sent them scurrying for things to do, with the result that the supposed benefits of one agency were cancelled by another. Dams have been built at the expense of the salmon supply. Areas have been reclaimed that should not have been diverted to agriculture at a time when a reduction of agricultural land is the policy. And, at the same time, money has been denied agencies like the Biological Survey, which was striving to put forth a program of conservation and law enforcement in behalf of our wildlife resources.

With respect to migratory waterfowl—our vanishing ducks and geese—the Roosevelt administration has failed.

With irrefutable facts at its command pointing to threatened extinction of several species, and with the danger emphasized by damage to breeding areas by a record drought, it has lacked the courage to adopt the only logical remedy—a series of closed seasons. It has contented itself with efforts to improve breeding places in our western states (a program that can benefit only a small percentage of North American waterfowl), and a few winter refuges. This effort in itself is a worthy endeavor, but it is one whose beneficial effect on our total waterfowl population cannot be demonstrated for several years. Meanwhile this confessedly inadequate program, because of its over-laudation, has aided influences inimical to conservation to defeat all attempts to stop shooting until there is an adequate increase.

With a great deal of fanfare and talk about "conservation" the present Secretary of the Interior has endeavored to have transferred to his own jurisdiction various government bureaus efficiently operating under the Secretary of Agriculture. The net result has been of no real help to true conservation, but has tended to handicap progress. An example is the Taylor Grazing Act, that paraded under the conservation banner, setting up in the Interior Department a grazing policy for public lands that ignored all principles of proper grazing procedure. This was done when there exists an excellently trained personnel for such work in the Department of Agriculture.

We have heard much about planning with respect to natural resources. We have seen little that resembles such a plan. We have, in fact, witnessed a lack of coordination between agencies concerned with renewable natural resources that is scarcely believable.

In short, the Roosevelt administration appears to have voiced an interest in conservation, but to have cherished many conflicting ideas as to what measures were really needed, and how to go about their attainment. As a result many positive results have been vitiated by negative or actually detrimental activities. We hope that if it is continued in power it will learn more about the real needs of conservation, and will adopt obviously needed steps in the direction of coordination and execution, devoid of politics. If the Landon administration takes over the reins, it faces the same responsibility, in which event we trust it will have the courage and sense to recognize the fact.

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THE CRIME OF HORICON MARSH ★

At the headwaters of the Rock River in southeastern Wisconsin there was once a great wildlife paradise. Before the white man came, it was a famous hunting ground of the Winnebago Indians. Thousands of every species of migratory waterfowl known to the inland waters of North America paused for food and rest at Horicon Marsh. By the efforts of the white pioneers it was dammed and made into an immense lake.

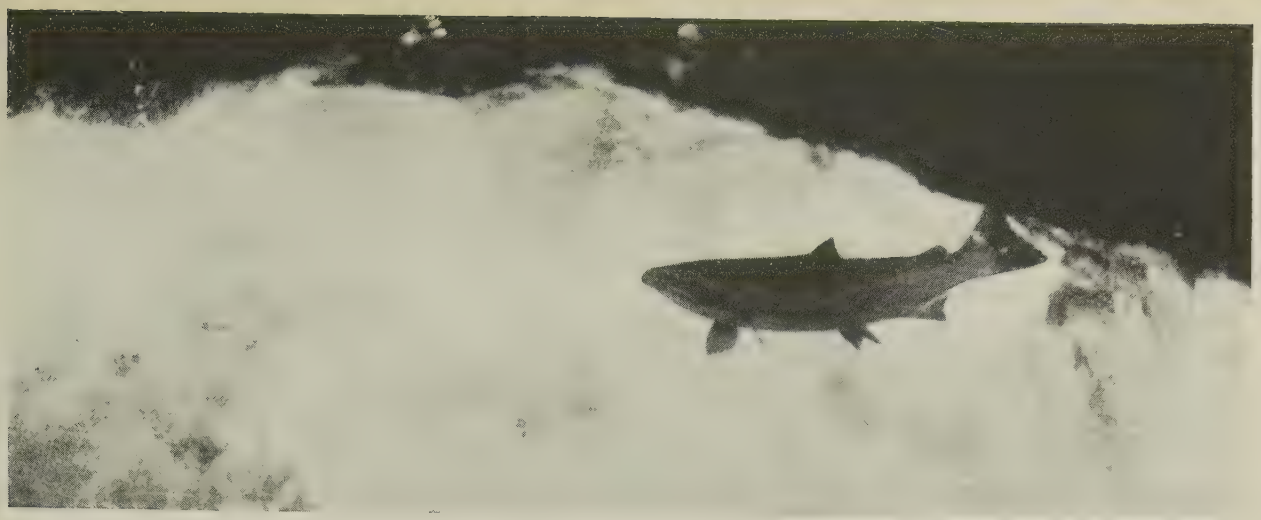
Until the late sixties steamboats plied the lake and it yielded many tons of fish yearly. Then, in 1868, a company of land promoters, masquerading as a manufacturing company, obtained permission to remove the dam, and three years later the marsh had reverted to something like its original state. But there were many small lakes and sloughs, and waterfowl and other wildlife were abundant. The late Emerson Hough believed that this 40,000-acre haven, four to six miles wide and sixteen miles long, was one of the finest feeding and breeding grounds in the United States or Canada. It was estimated that a half million ducks were hatched annually in the area. Wild rice, smartweed and many other forms of aquatic vegetation, excellent food for migratory waterfowl, grew in profusion. Snails of several species, and a profusion of water-breeding insects, relished by mallards, black ducks, pintails and teals, literally covered the swampland. This is a picture of Horicon Marsh as it appeared at the turn of the century.

In 1904 efforts were made to have established the Horicon Drainage District, but the Supreme Court of Wisconsin denied the petition. However, the promoters of the drainage scheme were undiscouraged, and within a few years, by means of a huge ditch with side branches, they had drained the marsh. For years they were permitted by the state to try to demonstrate the agricultural value of the dried-up peat bed of Horicon Marsh.

An attempt by the Izaak Walton League, made in 1924, to bring the problem of Horicon Marsh to the attention of the Federal Government bore no result, but in 1927 the legislature of Wisconsin made the area a Wild Life Refuge. A dam to flood it was completed in 1934. The final success of Horicon Marsh as a worth-while refuge seems to hang on an equitable valuation of the land. The records show that the original purchase price of the land was only five or six cents per acre. The assessed value, evidently based on the sums that have been expended on drainage and other worthless work, has mounted with the years, and it is now in excess of ten dollars per acre. During the manufactured "boom" of 1914, attempts were made to sell the land for as high as $200 an acre.

There would seem to be only one way to make the Horicon refuge a success—to take it out of State jurisdiction. In the hands of the Federal Government it could be transformed into one of America's greatest wildlife sanctuaries. By closing Horicon Dam, built expressly for the purpose of holding back the waters of the marsh, this fine area will not only be restored to the wildlife to which it rightfully belongs, but a huge reservoir will be provided at the headwaters of one of the Mississippi's tributaries, and become an aid in flood control.

We agree with Louis Radke, former state president of the Wisconsin Izaak Walton League, when he says that those who have been selling worthless land to the state and Federal Government at fancy prices should bear the cost of restoring the navigable waters of Horicon Marsh that they boastingly stole, because they alone are guilty. They deluded the public, and do not deserve profit.



ALASKA SALMON LEAPING AT A WATERFALL ON ITS WAY TO THE SPAWNING GROUND

ALL PHOTOGRAPHS BY WILLIAM L. FINLEY

The red salmon of Bristol Bay, Alaska, require special protection every five years to maintain the supply but an agreement to stop fishing in 1935 was abrogated under strange circumstance by the Commissioner of Fisheries

Salmon, Seals and Skullduggery

Activities of Commissioner of Fisheries Open to Question

By WILLIAM L. FINLEY

PLAYING fast and loose with the renewable natural resources of the United States has long been a national pastime. For decades this met little opposition, so vast were these resources. Gradually, however, the demand for conservation and wise use has gained strength, and although much has gone that never can be restored, continued abuse must not be tolerated.

One of the agencies of the Federal Government entrusted with vital natural resources is the Bureau of Fisheries of the Department of Commerce. It is now headed by Frank T. Bell, real estate operator and political appointee, whose knowledge of the past and present fisheries situation is sketchy at best. Evidence of this is to be found in the strange manner in which Mr. Bell has handled certain specific items under his administration. We refer to the amazing story of the Bristol Bay salmon and to the equally peculiar matter of the sale of fur seal skins. As custodian of these natural resources, Mr. Bell owes the American people an explanation.

The salmon fisheries of Alaska were headed down grade years ago from over-exploitation and a lack of constructive legislation. During the Coolidge administration these fishing waters were set aside as a federal reservation to permit the Bureau of Fisheries to make careful surveys of bays, rivers and lakes and their salmon runs. The Secretary of Commerce was given authority to limit fishing in any region by fixing the size and character of nets and other gear, by restricting the catch, and by establishing other rules needed to build up the fish resources of Alaska.

The conditions at the time justified this method of restoring a dwindling resource. However, these are autocratic powers, and their proper exercise depends on the integrity of the dictator. The annual Alaskan salmon pack of more than 5,000,000 cases, put up by more than seventy companies, is valued at about $30,000,000. This industry is under the thumb of a federal officer who can close up traps on a day's notice, rule out nets or seines, or, with a wave of the hand, close a fishing season here or open it there. His powers are such that profits of one corporation can be boosted to half a million, or another company can be squeezed for as great a loss.

The Alaska red salmon inhabiting Bristol Bay waters varies somewhat from the salmon of other regions in that it has a recognized five-year cycle from egg to adult, instead of one of four years. Commercial fishing has been carried on regularly in the bays and lower reaches of the rivers in this section, the headwaters of which are the most important spawning areas in the North. A serious shortage of these fish occurred in 1925, and again in 1930. The spawning beds in these years were only partially seeded.

After the close of the 1930 fishing season in Bristol Bay, former Commissioner Henry O'Malley met with the various packing interests in San Francisco. As a result a gentleman's agreement was reached not to operate in 1935. Most of the various Bristol Bay fishing companies showed farsightedness, because they would gain more in the long run by conserving the stock in these waters. During the summer of 1934, while in Alaska, Mr. Bell said he approved of a closed season in Bristol Bay for 1935. This assurance was sent out by the Associated Press and published in the newspapers of Alaska and others throughout the country. Later, at a meeting of the salmon

packers in Washington, D. C., Mr. Bell again made the statement that the season would be closed.

The "Federal Laws and Regulations for Protection of Fisheries in Alaska," issued January 19, 1935, by the Department of Commerce provided that: "All commercial fishing for salmon is prohibited in the Bristol Bay area from six o'clock antemeridian June 25, to six o'clock antemeridian August 3." This was certainly definite.

In *Fisheries Service Bulletin* dated February 1, page 6 this is confirmed and the following comment is offered:

"Revised regulations for the protection of the fisheries of Alaska were issued by the Secretary of Commerce on January 19, 1935, effective for the coming season.

"An important change is the prohibition of commercial fishing during the red salmon season in Bristol Bay, where about 22,500,000 salmon were caught in 1934. A statistical study by the Bureau has shown that the runs appearing in the calendar years divisible by 5 have been seriously depleted. The total catch of over 7,900,000 salmon in 1925 and only about 4,500,000 salmon in 1930 in this region, as compared with approximately 11,000,000 to 19,400,000 salmon in the intervening years, is considered ample evidence of the extent to which depletion has proceeded in the cycle due to return in 1935."

A CATCH OF ALASKA SALMON

Here the fish are being brailed from one of the traps into barges that will take them to the cannery

The fishing regulations in Alaska are always established by the government months ahead of time. The reason for this is that supply vessel headquarters are in ports like Seattle, Portland and San Francisco, a long way south. Cans and other necessary equipment are assembled and loaded early in the spring and complete crews are hired and taken north for the short fishing season. As soon as the season ends the whole pack is loaded and taken back to home ports.

But the policy of conserving the red salmon of Bristol Bay was to yield to one of exploitation.

In the service bulletin dated May 1, and distributed about the middle of the month, there appears a brief announcement that might be unnoticed by the uninterested, or which might serve as a vehicle carrying welcome assurance to a friend. Evidently paving the way, it reads:

"On April 2 announcement was made by the Secretary of Commerce that the regulations closing the Bristol Bay area to salmon fishing this season will not be relaxed unless it appears, after the run has started, that there will be sufficient number of fish to permit commercial operations without impairing the future supply."

The June and July issues furnish no hint of a change of policy, but in the issue of August 1 (distributed about August 12) there occurs this significant item, which appears to have been devised to camouflage this extraordinary action:

"In view of reports that the run of salmon was diminishing, a supplementary regulation was issued by the Secretary of Commerce on July 12, whereby the weekly closed period on salmon fishing in the Nushagak district of the Bristol Bay area was extended 36 hours. This made a total closed period of 108 hours each week in that locality.

"Various representatives of the industry felt that inasmuch as the first 9 days of fishing in the Bristol Bay area had been lost through the closed season, it was advisable to extend operations beyond the normal closing date of July 25. The runs of fish, however, did not sustain this contention and the fishing season was ended by the regulations at 6 P.M. July 23. Telegraphic reports show that 7 shore plants and 2 floating canneries drawing from these waters put up a total pack of more than 225,000 cases of salmon, as compared with 1,770,749 cases prepared in 1934 when 23 canneries operated in the region. A poor run was anticipated this year and operations were curtailed accordingly."

These quotations from an official publication of the Bureau of Fisheries are cited here in order that they may be kept in mind as we review what actually happened during the salmon season of 1935 at Bristol Bay, Alaska. They are important in showing the entire picture of the strange change in regulations.

Among the larger companies operating in Bristol Bay waters are Libby, McNeil & Libby, Alaska Packers, Pacific American Fisheries, and others. Early in the spring of 1935, Libby, McNeil & Libby began loading their Bristol Bay vessels on a full capacity scale just as if the season was to be open. This naturally aroused the suspicion of competitor firms. Hiring and taking a full crew north with a supply of cans to put up 150,000 cases of salmon was a big gamble unless this firm knew exactly how the cards were to be dealt.

Although the Alaska Packers and the Pacific American Fisheries are both large corporations with plenty of funds, they apparently could not see any reason for spending several hundred thousand dollars preparing for a fishing season when the various canners had agreed on a closed period, and the government had so ordered. A federal regulation to protect the salmon in Alaska was assumed to be binding and to be relied upon.

The Bristol Bay salmon season had been open in previous years from June 25 to July 25. The supply ships of the Libby corporation and their associates arrived at Bristol Bay early in June. Before the end of the month

their fishing boats and scows were manned for the usual open season and their nets were ready for a haul. Their canneries were open for business with full canning crews, and in addition they had employed many local fishermen.

Years ago L. G. Wingard was employed by the Bureau of Fisheries. At the suggestion of Mr. O'Malley he resigned for the good of the Service. When Mr. Bell was appointed Commissioner he transferred and later retired Dennis Winn, who had long held the position of Alaska agent for the Bureau of Fisheries. He then reinstated Mr. Wingard who is now acting as his right-hand man in Alaska.

Deputy Commissioner Jackson from South Carolina, who is unfamiliar with Alaska fishery problems, arrived with Mr. Wingard at the Government Marine Ways at Naknek, Alaska, on June 28, 1935. A private conference followed with Mr. Graham, General Superintendent at Bristol Bay for the Libby corporation.

The bomb was touched off in Washington, D. C., on July 3. A new federal regulation opened up the Bristol Bay salmon season at six o'clock antemeridian on July 4, a day of national celebration for the Libbys and their associates.

BULL FUR SEAL OF THE PRIBILOFS
Member of the herd administered by the United States as a continuing source of fur supply

Section I of the Act of Congress of June 6, 1924, protecting the fisheries of Alaska provides: "That every such regulation made by the Secretary of Commerce shall be of general application within the particular area to which it applies, and that no exclusive or several right of fishery shall be granted therein, etc." Technically, last year, there was no violation of this law. The Alaska Packers, Pacific American Fisheries and others had equal rights to net and can salmon. They also had every reason to stand by the federal law and live up to the closed season. They were unprepared for the sudden change of policy from conservation to exploitation.

How did the Libbys come out? They had eighty fishing boats registered. July 6 dawned on three of their scows steaming in with 100,000 salmon. The records show that they put up 132,875 cases of canned salmon at Egegik Bay and it is reported that they took an additional 36,474 cases in co-operation with a floating cannery. A pack of more than 8,000,000 cans was not so much of a gamble after all. They had the laugh on their competitors who were minus packing crews and cans.

In the *Fisheries Service Bulletin* of March 2, 1936 the 1934 pack of salmon of all species for all of western Alaska is given as 1,859,319 cases of which, according to the *Pacific Fishermans Yearbook* (1935) the Libby company packed 347,091, or about 18.5 per cent. For 1935, the *Fisheries Service Bulletin* credits 276,853 cases to this area. According to the 1936 *Pacific Fishermans Yearbook,* the Libby company's 1935 pack in this area was 132,875 cases, about 48 per cent of the total. If to this official total is added Libby's reported pack in co-operation with the floating cannery, their pack in Bristol Bay amounted to about 60 per cent of the total output for that season. These figures indicate that this company made good use of an advantage of some kind.

Yet the victims dare not protest so long as the Commissioner of Fisheries holds the position of dictator. He might retaliate and close their traps on a day's notice, eliminate some of their nets or seines, or close the fishing season in some other section of Alaska where they operate.

Nevertheless, these companies did not have their eyes closed. They were wise enough to send salmon experts to Alaska. These men checked the salmon runs and collected the facts to prove that the 1935 run of Bristol Bay red salmon needed full protection from commercial fishing. Under the present régime the Bureau of Fisheries is not likely to present the truth to the public. The situation demands a thorough investigation where all the facts can be recorded under oath.

If Libby, McNeil & Libby did not have advance information that the federal regulation issued on January 19, 1935, would be rescinded and the Bristol Bay season opened at the last moment, why did they spend the large amount of money necessary to put their fishing vessels, tenders and crews on the ground fully prepared just before the new order shot out of Washington, D. C.? And how do the officials justify the concentration of so large a percentage of the total pack in the hands of one company? In 1934 twelve companies operated in that area.

Now let us consider the fur seal industry of Alaska. The Bureau of Fisheries for many years has had complete charge of the Pribilof Islands in Bering Sea, managing

A SEAL ROOKERY

A bull in the foreground with other bulls and their harems massed on the rocky shore in the background

the native Aleuts and the entire natural resources of this area. The rehabilitation of the fur seal herds has long been referred to as an example of how the government can profit in conserving these animals with proper supervision and application of scientific principles of breeding. Experts were trained and understood the methods required to increase and perpetuate the herds. Without show of politics or favoritism, they managed the sealing operations and administered the affairs of the native Aleut workmen.

When Mr. Bell took office, the experts who had successfully administered this work for many years were discharged, with the single exception of the Superintendent. The former régime was upset and a new personnel, including Mr. Bell's daughter and son-in-law, as well as others with no experience, was put in charge. The details of the new management and its effects are not a credit to the present administration.

For many years a certain percentage of the seal herd has been taken each year for skins. These were mainly three-year-old males called bachelor seals. The skins were blubbered and salted, then shipped to St. Louis where they were tanned and dyed, and sold at public auction, by the Fouke Fur Company.

According to contract while the late Henry O'Malley was Commissioner of Fisheries, the Fouke Fur Company received $12.50 per skin for the first 25,000 of each year processed and marketed, with the processing cost reduced by $1.00 per skin for each additional 25,000. When the seal skins were tanned and dyed, the company sorted, stored and advertised them for sale, taking charge of the public auctions at St. Louis. In return for this service the company was given a commission of 3¼ percent on all sales.

When Mr. Bell took office the prices of all furs were low. Mr. O'Malley, who was dismissed to make a place for Mr. Bell, proposed, early in 1933, a new contract with the Fouke Fur Company. Under this contract the company was to receive $10.50 each for processing the first 25,000 skins, less a reduction of $1.00 per skin for each additional 25,000. The government was to pay the same percentage mentioned above for auctioning and selling and receive all the profits.

Inasmuch as Mr. Bell was to take office, Mr. O'Malley felt that it was fair to hold up this contract for the new Administration to sign. It was then that Mr. Bell, who was entirely inexperienced in the seal industry, insisted on certain changes that are difficult to understand since, under it, the government takes a big loss.

Under this contract, signed by Mr. Bell on April 29, 1933, the Fouke Fur Company guaranteed the government $1.35 for each seal skin they processed and sold. Too small an amount, it was soon discovered. Next, for all processed skins then on hand the Fouke Company were to pay the government $3.35 each when sold at auction later. One point may be mentioned about this small guarantee. If the fur market should collapse completely and a processed skin should sell for only $10, the United States would get its guarantee, while the Fouke Company would receive, for processing, the sale price less the guarantee.

Prices for seal skins were the lowest in history, but never as low as a $10 average. Anyone at all familiar with the fur business could read the records. The three-year-old Pribilof seal skins, tanned and dyed, make the finest and most serviceable fur garments in the world. The prices of first-class skins had ranged from $20 to $60 during the years. Prices might well be even higher, but the fur dealers and garment makers have never made a specialty of advertising these remarkable furs because of their comparatively small number. The highest take was very little above 50,000 annually.

At the time Mr. Bell made his contract, in 1933, with the Fouke Fur Company, he claimed through the press of the country that he had gained a big advantage for the government, intimating that the previous contract did not protect the people's interests. Let us consider this contract and its results.

During the year 1933 at three auctions a total of 49,900 processed skins were sold at a total value of $873,585.97 and at an average price of $17.50 per skin. If the Fouke Fur Company was paid $12.50 each for processing these skins and the government received $3.35 each, the company took a cash bonus of $82,335 on the 1933 sales which should have gone to the United States Treasury under a sensible business administration.

On all skins taken after April 30, 1933, and up to January 1, 1936, the Fouke Fur Company in return for a small guarantee to the government of $1.35 per skin presumably received one-half of the government's profits on the fur seal sales, plus 3¼ percent of the gross sales for sorting skins and handling the auctions.

A few months after the Fouke Fur Company signed this contract of April 29, 1933 with Mr. Bell, the conclusion must have been reached that this guaranteed too large a profit to the company because on December 28, 1933, another written agreement modifying the earlier contract was entered into. This increased the minimum guarantee to the government from $1.35 per skin to $2.35. It stated that whereas the company has offered to increase the minimum sum, it is deemed best to the interests of the United States to obtain the aforesaid increases. This clearly proves that the contract of April 29, 1933, was unfair to the United States, although Mr. Bell at the time advised the press of the country that he was protecting the people's interests.

Later figures also indicate that Mr. Bell did not protect the government, but played into the hands of the Fouke Fur Company. On April 27, 1936, 22,373 Pribilof seal skins were sold at an average price of $26.85. The cost of processing was $10.50 each. To this $2.35 was added, which the Fouke Fur Company voluntarily gave the government instead of the contracted price of $1.35 per skin, making a total of $12.85. Since the average selling price was $26.85, this left $14 profit per skin, $7 going to the company and $7 to the government. In other words, the government lost $156,611 on this auction sale.

In 1935 there were sold at the auctions 50,753 skins at an average price of $23.39. Deducting the processing charge and the guarantee to the government, this left $10.54 to be shared equally by the government and the company under Mr. Bell's contract. The result was that the government appears to have lost $267,468.31 on the 1935 skins.

Mr. P. B. Fouke has done well by his company. He has a contract extending to December 31, 1938. Each summer he sends a crew of men to the Pribilofs to blubber and salt the seal hides, but the government pays the traveling and living expenses of these men, and also pays the Aleuts for killing and skinning the seals. All salted hides are delivered to the Fouke Fur Company at St. Louis on Federal bills of lading. He can figure on more than a half a million dollars yearly for processing hides, plus 3¼ percent profit on all gross sales. Last, but not least, is his half share in the net government profits. It seems obvious that more than $1,500,000 will fall into his hands instead of going into the Treasury of the United States during the term of this contract.

Just why this concession to a private company was allowed by Mr. Bell is rather difficult to comprehend. His announcement through the press that for the first time in history the Pribilofs were on a paying basis and had turned a profit into the Treasury due to this new contract, does not agree with the facts. Few people have ever seen this contract or studied its contents. Few know that under the Bell administration the fur seal industry of the United States appears to be a private and not a public business.

During the years when pelagic sealing was carried on the fur seals were reduced until they were on the road to extinction. A treaty was finally drawn up between the United States, England, Russia and Japan in 1911. The guardianship of the seals of the Pribilof Islands, the largest herd in the world, was vested in the United States. Under this treaty the United States was to retain seventy percent of the net profits on the sale of furs from these islands, and was to pay to Great Britain and Japan fifteen percent each. Great Britain has been wisely taking her share of the catch in skins, but Japan so far has elected to take her share in cash. The well-being of the fur seals of the world depends on this treaty.

We believe that the American people, on the basis of the evidence cited in this article, are entitled to a thorough investigation of the manner in which their property in the form of natural resources in salmon and seals is being managed by the official to whom it is at present entrusted.

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VISIT HAWK MOUNTAIN

At this time of year it is appropriate to remind all bird lovers, particularly those interested in the Raptores, that Hawk Mountain Sanctuary, near Drehersville, Pennsylvania, is open to all gunless guests. The greatest variety of species of hawks may be seen during October, and a cold, windy day is likely to be a lucky one for observers. The best time to see the golden eagles in their southern flight is during November, and several other species are still flying at that time down this fly-way in the mountains.

The Sanctuary can be reached by turning off Route 22 —which runs from Harrisburg to Allentown—at Hamburg and taking Route 120 toward Pottsville. The turn-off to Drehersville and Hawk Mountain is well marked. From Washington take Route 212 to Reading and Route 120 to the turn-off; from Philadelphia take Route 422 to Reading and then 120.

As Mrs. C. N. Edge, Chairman of the Emergency Conservation Committee, which has saved Hawk Mountain says: "It is truly a friendship-making spot, for Nature lovers of many states flock there to enjoy one another, to study the birds, and to benefit by the inspiration of the wonderful air and unsurpassed view."

SOME FACTS ABOUT SPORTSMEN

UNDER this heading the National Association of Audubon Societies publishes two tables in *Bird Lore* for July-August, 1936. From a short study of these one may gain rather definite ideas on several points of interest both to sportsmen and to the general public. We congratulate *Bird Lore* on the compilation and publication of these valuable tables.

The tables bear these apt headings: "Relation of Sportsmen to Population" and "Relation of Sportsmen to Area". The figures are as of 1936. They supplement data published in *Bird Lore* of November-December, 1935. The figures representing numbers of sportsmen are from data put out by the Biological Survey; those on population are from the *World Almanac*.

New Jersey heads the list in the number of sportsmen per square mile—14.2. States following closely are Pennsylvania, with 12.7; New York, 10.8; and Ohio, 10.3. The New England States come next, ranging from Massachusetts, with 9.1 hunters per square mile, to Maine, with 2.9, and little Rhody boasting 6.6. Thus the more thickly settled states, with the least natural opportunity for game to thrive, have the thickest hunter-population. The lowest hunter-population occurs in some of the larger western states, with the dreariest prospect (from the standpoint of shells sold per acre) involving Nevada, where each hunter has 20 square miles to cover. And one has to comb a square mile pretty carefully in some parts of Nevada to find anything to shoot at.

As to number of hunters to total population a different story is told, naturally. The best (or worst) ones are Montana and Idaho, where there is one hunter to a little over six people. Hunters are hardest to find in Delaware, where there is only one to 147 citizens. This condition affords quite a contrast to Delaware's neighbors, New Jersey and Maryland, where the terrain to our unpractised eye is rather similar, but where we find a hunter to about 36 and 20 people, respectively.

There are many points to be borne in mind in studying the full import of these tables. In this connection, we would refer the student to the last paragraph in the Association's introduction to the tables, which furnishes a valuable text:

"We trust that many sportsmen will consult these tables. Those who have been prone to blame the scarcity of game on such factors as predation should learn much from these figures. As has been pointed out in Audubon press releases, and items in this magazine, purchasers of Duck Stamps—the only sportsmen legally entitled to hunt Ducks—represent a minute minority of the population of the United States; in 1935 they comprised only about one-quarter of one per cent."

How much do they think their dollar should yield them?

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THE POWER OF PROPAGANDA

It was propaganda, in large measure, that gave woman a part in one of man's questionably useful doings—the cocktail hour. It was propaganda, almost entirely, that led women to vie with men in the unnecessary and possibly harmful use of the cigaret. Remember when the advertisements ventured no more than having a woman ornamentally standing by and saying "I don't mind". Next she was lighting the cigaret for her handsome partner, next taking a tentative puff, and finally publicly smoking and giving individual testimony that "it's good for the nerves".

The success of propaganda along these lines has not been lost on advertisers with other interests, and one branch of them, the gun, ammunition, and sporting goods manufacturers, is pursuing an identical campaign to put women in the killer class.

In the world of sporting advertisements, she was first merely an observer, or camp companion, then she was promoted to being an angler, and finally to a full-fledged follower of gun and dog, and even a big game hunter. Fortunately actual progress of events has not kept up with the advertising urge, but some women have gone over into this traditionally masculine field and the force of example leads to the belief that in time a great many women in the class that can afford it will take up hunting.

If they only knew it, the propaganda of the munitionists is a sort of dying effort, for hunting has long been vastly overdone and will now come to an end with a rapidity in proportion to the degree of success of the present misguided campaign of stimulation. Women are being invited into a field that man has already overexploited, merely to prolong a period of prosperity—of easy money making—for sporting goods manufacturers.

She is moreover being allured and urged into an activity—killing for fun—that calls for qualities the very opposite of those which have made woman the hope of the world. She is more sound biologically than man so she should appreciate the desirability of preserving the biological world as a whole. She is the more conservative so should lean toward conservation rather than exploitation of Nature. She is the more humane and taking thought surely will oppose, rather than take part in, persecution of our little brothers of the wild.

The human race has relied upon women to lead humanitarian movements, but now the killer interests would have her reverse her steps. May we hope that she will fully consider in what way her proper destiny lies, whether in the field of oppression, cruelty, and exploitation of our fellow creatures, or in that of sympathy, mercy, and conservation. Upon her choice depends in great measure the future quality of what we are pleased to call civilization.

The Falcons of Manhattan

By ROSALIE EDGE

ABOVE the hubbub and confusion of New York, within sight of dense crowds, within hearing of the roar of traffic, there flies an untamed creature of the wilderness. A hawk has been observed to make its kill from among the pigeons living in the tower of the Riverside Church. It is reported that members of the congregation seek to break the laws of New York State, which specifically protect this hawk, and to kill it, in order to preserve every pigeon.

The hawk of Riverside Church is not a pigeon hawk, *Falco columbarius,* as reported in the newspapers, but a duck hawk or peregrine falcon, *Falco peregrinus anatum.* This bird, never plentiful, is now rare. Its breeding places are restricted, for it nests chiefly along rivers and beside lakes. It has suffered, together with all the birds of prey, from the propaganda of the gun and ammunition manufacturers who spread false stories of the destructiveness of the hawks and other predatory birds. With the decrease of game, shooting-seasons have been shortened, and the ammunition makers, who seek all-year-'round markets for their wares, urge the killing of many an innocent wild creature on one or another trumped-up pretext. The duck hawk is now so scarce that it is further threatened by collectors. Its nests are rifled by oölogists, for, with approaching extermination, the price of both skins and eggs mounts to a high figure. And capping the climax of its persecution, now that falconry has been revived, young peregrines are often stolen from the nest.

The Palisades of the Hudson River still boast nesting peregrine falcons. In the days of Henry Hudson the river was filled with waterfowl, and the surrounding forests were alive with land birds in the early spring when the peregrines needed food for their young. Flocks of passenger pigeons then darkened the sky. Now the native pigeons are extinct, the forests are gone, and the polluted waters are nearly devoid of wild life. The peregrines of the Palisades, with the wonderful adaptability that characterizes creatures of high intelligence, have learned to make their kill from among the pigeons of foreign origin, the imported starlings, and the European sparrows that live in the parks of New York and on the roofs of the buildings. In the spring one may sometimes see a peregrine winging high above a crowded avenue: always it is a sight to make one's heart leap, so startling is it to behold from the city street a free creature of the wild. I have observed peregrines from various points in the heart of the city; once, while tense in the dentist's chair, I saw one swoop and carry off a pigeon to within the spire of St. Patrick's.

The sight of a peregrine falcon brings to our imagination the hawking parties of the courts of Europe, and links modern New York with the chivalry and pageantry of the Middle Ages. The larger female was "the" falcon, and she gave her name to the sport of kings. The tapestries of the Lowlands and of France picture the richly-clad

COURTESY OF NEW YORK ZOOLOGICAL SOCIETY

FIGHTING FOR EXISTENCE

The duck hawk, never plentiful, is now becoming rare. A few of these birds, with the adaptability characteristic of high intelligence, visit the heart of New York, to live on its flocks of alien birds

nobles riding to the chase mounted on gaily caparisoned horses, the rank of each courtier proclaimed by the bird, jessed and hooded, that sat proudly on the wrist of its master and devoted friend. No noble of rank beneath an earl might carry the peregrine. It was known as the "noble bird", keen, intelligent and intrepid. The king, or emperor, who alone might carry the golden eagle, may well have envied his nobles their lighter, swifter and almost equally powerful peregrine, for this falcon is perhaps of all birds the strongest and swiftest in proportion to its size, and is unmatched in skill and daring. The eagle depends on his size and weight, and on the power of his talons, sharp and polished as tempered steel; the peregrine is a master of strategy; adroit in intricate turns, capable of spiralling to dizzy heights, it carefully plans the stroke of instant death that, singeing the air, it deals by the impact of its downward rush.

Mankind too often fearfully awaits death by disease or senile decay, and is seldom granted the mercy of quick release falling like a meteor from the sky. But man presumes to interpret mercy with the term "humane". The dwellers of Riverside Drive, who may choose in the markets their plump pigeons and dainty squabs, who, if sportsmen, may kill their daily bag of ten ducks, or twenty mourning doves, "humanely" cry out upon the free and lordly falcon, which, even among the roofs of Manhattan, lives sparingly and in harmony with Nature's laws.

PART OF THE NATURE EXHIBIT IN THE SCIENCE ROOM, SHERRARD SCHOOL, DETROIT
The problem of maintenance is solved by the use of pupil-assistants who take pride in having a part in caring for the plants and animals, many of which they supply themselves

Life in the Science Room

By DENNIS GLEN COOPER

"COME ON, Jim, now we go to General Science! Wonder what we'll see in there today."

"It's hard to tell. I'm anxious to see how the baby waltzing mice are coming along. Aren't they the craziest things you ever saw?"

"No worse than that rabbit, Georgie. Have you seen his latest trick? Lies flat on his back with his feet in the air. He sure looks funny!"

"Here we are. Let's go in the back door. Look at this bulletin board! What's it about? . . . 'Early Life on the Earth' . . . Look at this . . ."

"Dorothy, c'mere. Did you see this exhibit on Switzerland? Isn't that carving beautiful?"

"Hey, Bob, it looks as though we're going to have some experiments today. Wonder what this is going to be about. Let's see. . . ."

"Hello, Georgie! How's Georgie today? Stand up on your hind legs and I'll pet you!"

"Ooo—look at those snakes. Aren't they the strangest things?"

"Hi! John-Peter, are you going to sing for us again today? You're the most cheerful canary I've ever heard."

(After five or ten minutes of these exuberant remarks:)

Buzzz————

"Oh-oh! There's the buzzer. Let's get to our seats!"

* * *

These and other similar bits of conversation may be heard at any time near or in the General Science Room at the Sherrard Intermediate School, in Detroit. One listening to them for the first time might consider them rather strange, but the explanation is easy.

The ninth grade General Science work in our school is almost entirely biological. Since biology is the study of living things, we believe that examples of life in as many forms as possible must be brought to the pupils before they can truly appreciate the meaning and value of the course. In our room we regularly maintain alive many kinds of plants and animals. We have such forms of animal life as protozoans, earthworms, insects, crayfish, snails and clams, tropical and cold-water fish; newts, salamanders, frogs and toads; snakes, alligators, turtles and lizards; canaries and other birds; and a variety of such mammals as white and "waltzing" mice; white, hooded, and kangaroo rats, and our special pet, Georgie, the rabbit. Other animals, such as guinea pigs, gophers, squirrels, parrots, muskrats, and monkeys are occasionally brought into the room. We have established numerous balanced fresh-water and marine aquaria, as well as several interesting terraria made up as woodland, bog, or desert habitats.

Ideally, the study of Nature should be carried on in the field. In a large city this becomes impractical, and it is difficult to develop in pupils an enthusiasm for the study of living things solely through the use of books, preserved or mounted specimens, or even moving pictures. Many city children have never experienced the joy of owning pets, nor have they ever watched at close hand the fascinating habits of animals heretofore known to them in name only. To compensate somewhat for this unfortunate condition we have brought in these many creatures, a constant source of delight to the pupils. In other words, we have brought Nature into the classroom. Some of our animals are contributed by the children; others are acquired by the teacher. The school also pur-

chases many fine specimens for the room from the General Biological Supply House of Chicago.

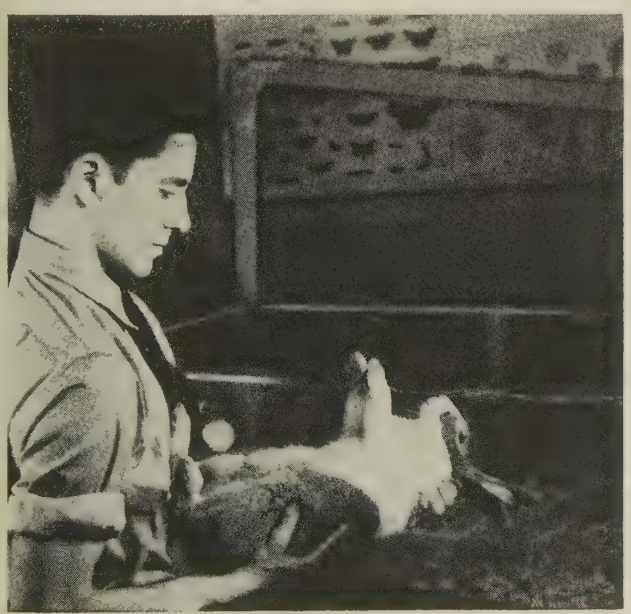
In many instances the exhibits require little care. Aquaria, once established, seldom need attention. Food is provided regularly, glass tops are dusted off, refuse removed, and water added to make up for evaporation. The water in the tropical aquaria is kept at the proper temperature by an electric heater, thermostatically controlled. No further attention is necessary.

The terraria animals (frogs, toads, newts, lizards, etc.) require little besides feeding. Meal worms, easily raised in the room, constitute their principal food. These are ordinarily taken with apparent relish, force-feeding rarely being necessary. Alligators and garden snakes are kept in an attractive screened "rock-garden" terrarium in which ferns, grass, stumps and small plants surround a shallow rock-bordered pond. During the winter months these creatures are force-fed with raw meat; in warm weather they readily take earthworms which may then be procured easily.

THE WALTZING MICE APARTMENTS

These strange creatures, because of an inherited brain defect, are unable to move in straight lines and must always travel in circles. It is these gyrations that give the animal its name

The mammals, which arouse the most enthusiastic responses among the pupils, require the greatest amount of care. In the main, their cages have been built by pupils in our shops. The shavings and sawdust used to cover the cage bottoms are also provided by the wood shop. Since refuse is removed and new shavings provided daily, the cages remain fresh and clean. Quite a variety of foods is needed to keep the animals healthy. Mixed grains and seeds are purchased from a local pet store, while such tid-bits as cabbage, lettuce, and celery leaves, carrot tops and apple peels are provided by the school lunch counters. The details of feeding and caring for our many different pets have been worked out over a period of years. Much valuable information has been secured without cost from the General Biological Supply House.



"GEORGIE" IS THE PUPILS' FAVORITE

In appreciation of his long service, he is always let out of his cage after school to romp about the room to his heart's content

There is no question as to the popularity of certain of our exhibits. Ranking first, unquestionably, is Georgie, the rabbit, who has been raised in the room, and who has now been with us nearly five years. Everyone loves this friendly little fellow whose cage top is always off in order that his many friends may pet him. He knows and answers to his name; stands on his hind legs in a most amusing fashion when he wishes to look about the room; and will even lie flat on his back, with feet in the air, if he is coaxed. He is always let out of his cage after school to romp about the room to his heart's content.

Exceedingly interesting are the "waltzing" mice, tiny black and white creatures which, because of an inherited brain defect, cannot travel in straight lines, but must move in circles. Frequently they go into a wild spin which may last for several minutes. It is a hilarious sight indeed to see father, mother, and babies all spinning at once. Their houses must be provided with front and back doors in order that they may run in one and out the other!

The kangaroo rats, natives of Arizona, are also great favorites in our "zoo". Since, in their native haunts, they burrow in the sand, in our sandy-floored cages they spend much of their time in a box having a single round opening. They think they're still in Arizona! Their outstand-

ing characteristics are long hind jumping legs and short fore-legs and hairy tails, which especially differentiate them from their neighboring relatives, the rats, mice, and muskrat. Our kangaroo rats have become quite tame. The pupils thoroughly enjoy watching the little brown bodies hopping rapidly about when we have removed them from the security of their dark boxes. It is fun to hear them scratching or jumping when the room is otherwise very quiet. They are especially fond of sunflower seeds and consume large quantities of them.

Of course our white and hooded rats have always been popular. Born and raised in the room, they are very tame. Pupils love to hold them and play with them, and it is difficult for even the most inveterate rat-hater to suppress a smile as several of the soft, furry busy-bodies stand on their hind legs and poke their noses through the cage as though to say, "Have you anything for us?"

And then there are the glorious voices of our canaries! What joy these songsters have brought to hundreds of children by their thrilling bursts of merry notes. John-Peter's cheery scales can be heard throughout the school when the classroom doors are open. At the present writing John-Peter and Rosemary, his lady, are busily engaged in building a nest, to the great delight of the many onlookers!

Besides these living forms, the Science Room has many other attractions. Weekly displays of attractively-arranged pictures, drawings, or reports are placed on the bulletin boards, while special table or wall-case exhibits, loaned to us by the Detroit Children's Museum, and changed weekly, also add variety and interest.

The proper maintenance of a room like this requires much time and effort. We have arrived at a solution to this problem through the use of pupil-assistants—boys of the ninth grade who come to the room after school hours to work at whatever tasks especially interest them. Some feed animals, clean cages, or care for plants, while others arrange bulletin boards, exhibits, or experimental apparatus, or make themselves as helpful as they can in any number of other ways. These lads enjoy their work immensely, and derive invaluable training from such cooperative effort. During short vacation periods the boys visit the school periodically to care for their many friends, and even in the summer they keep most of the animals at their various homes.

When a class enters the room the pupils are encouraged to move about freely to inspect whatever interests them. They wander here and there talking and laughing as they examine the many displays and exhibits. When they are called to order by an electric buzzer, they settle down quickly and prepare for the day's discussion.

For the rest of the hour many activities may be introduced to maintain the enthusiasm developed during the free period. Bulletin boards and exhibits are made an integral part of the classwork, experiments are performed, characteristics of plants or animals similar to those kept in the room are discussed, many appropriate motion pictures and slides are shown, special reports are given, and teacher lectures are introduced occasionally, all making for variety and interest. During the study period, microscope work, individual observation of living materials, charts, bulletin board exhibits and study of preserved specimens all carry further the idea of variety, activity, and stimulation which are ever the keynotes of our technique.

It is true that this organizing requires considerable time and energy, but the joy of seeing daily the interested countenances of so many enthusiastic youngsters, for whom the science hour is all too short, is a reward that ordinary standards cannot measure.

•

The Ingenious Mother Mouse

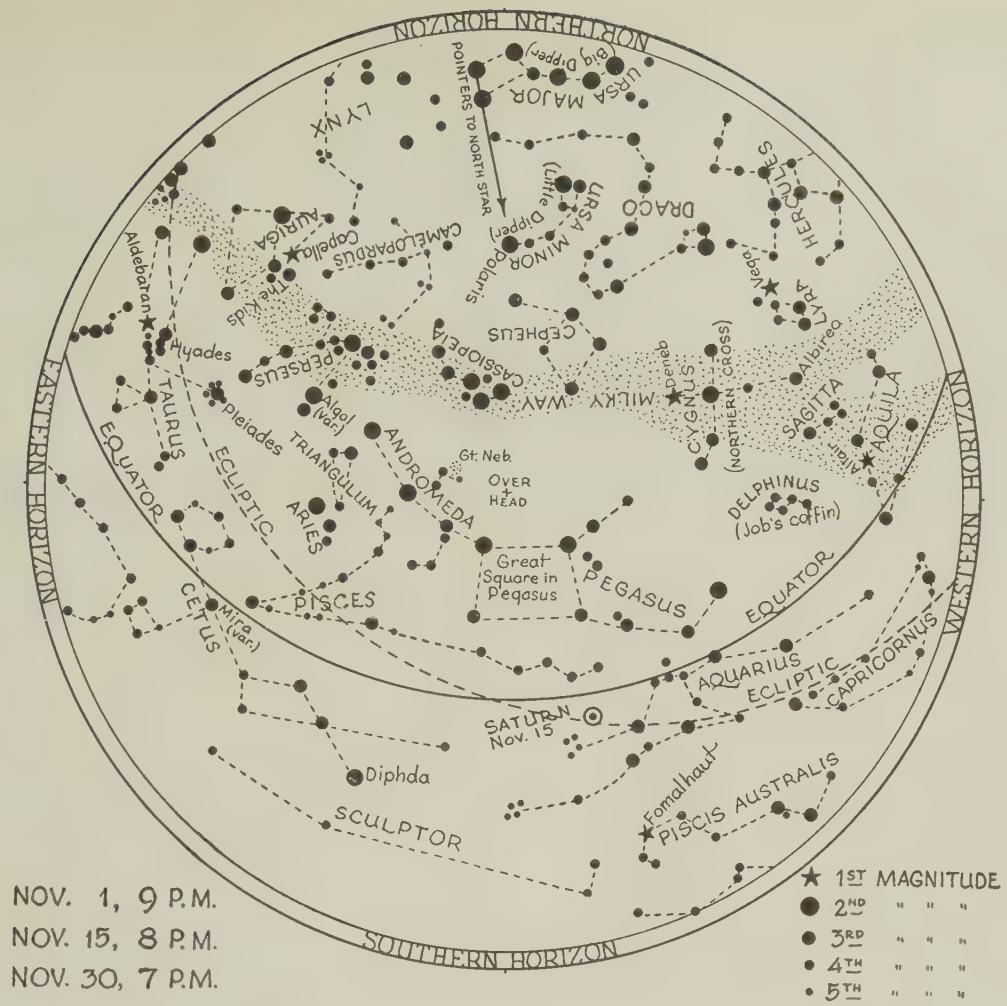
By W. W. WHITE

After a hard rain, the small stream at the foot of our steep bank was overflowing the flats where the lily pools are located, threatening to wash away the goldfish. While wading about through the tall grass my attention was attracted by a little squeaking sound. A line of ripples disclosed a meadow mouse swimming towards a clump of grass, where it climbed a stem to a nest-like structure about three inches above the water. As I carefully approached the nest, the frightened mouse swam away to dry land and hid from view.

There were three baby mice tucked away in a temporary cradle that the mother mouse had hurriedly constructed about eight inches from the ground, the water being about five inches deep. All the nest material must have been placed there within an hour's time for it consisted of green grass blades, freshly cut.

The hairless baby mice continued to squeak and once more the mother started to their aid but returned to hide when she saw me so near the nest. It was evident that the original home of these three meadow mice had been flooded and the frantic mother had hastily constructed this new nest as an emergency measure to keep her babies safe from flood.

Many think of mice only as destructive pests, but instances like this indicate qualities akin to our own.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Venus Passes Jupiter in November

By ISABEL M. LEWIS

THE TWO brightest planets, Venus and Jupiter, will be conspicuously visible in the west immediately after sunset this month and it will be interesting to observe how rapidly their relative positions change even within a few days. Both planets are now moving eastward, but Venus, because of its nearness to the earth, is moving much more rapidly than Jupiter. On November 13 it will be in conjunction with Jupiter and then will pass about two degrees south of it.

At the beginning of November, Venus will be in Scorpio some degrees west of Jupiter and close to the red, first magnitude star, Antares. It will pass from Scorpio through Ophiuchus into Sagittarius during the month. At the end of the month it will be very close to the bowl of the little inverted milk dipper that is the most striking configuration of stars in Sagittarius. Jupiter will pass from Ophiuchus into Sagittarius during the month, and since the sun is moving eastward more rapidly than Jupiter, the giant planet will draw nearer to it. By the first of December it will be too low in the west at sunset to be seen to advantage. Venus, on the other hand, is moving eastward more rapidly than the sun, so its distance from the sun will increase during the month and it will appear higher in the west at sunset each night.

Although Venus appears much more brilliant than Jupiter, this is due to its nearness to the earth and not to its great size. Venus is so nearly equal to the earth in size that it is often spoken of as the earth's sister planet. Jupiter, on the other hand, is the largest and most massive planet in the solar system. It is, in fact, larger than all the rest of the planets combined and is the equal in bulk of 1312 planets the size of the earth. It has, in addition, nine satellites, the four brightest of which were discovered by Galileo and are referred to as the historic, or Galilean, satellites. They can be easily seen with the smallest telescopes and two of them exceed the planet Mercury in size.

The motions of these four moons of Jupiter around the giant planet, their eclipses in its shadow and their occultations, or disappearances, behind its disk, as well as their transits and those of their shadows across the disk of Jupiter, are easily observable with small telescopes. So, also, are the dusky cloud-like belts of Jupiter that lie parallel to its equator and change in number and width from time to time. All these phenomena make this planet one of the most interesting of all to observe with a telescope.

Venus, like Mercury, and probably Pluto, has no satellite and, except for the fact that it has phases like the moon because its orbit lies inside that of the earth, it is not an interesting planet to observe in the telescope. Its heavy veil of clouds and dense atmosphere completely hide its surface from view. Because no surface markings can be seen it is still in doubt whether the planet has a long or short period of rotation on its axis. Venus is so brilliant that it can be readily seen in daylight when at or near its greatest distances east or west of the sun, or its elongations, as they are called. On November 13, when the two planets are in conjunction, the distance of Venus from the earth will be 117,700,000 miles and that of Jupiter 559,300,000 miles. Venus is now exhibiting the gibbous phase in the telescope and is still on the farther side of its orbit from the earth but it is rapidly drawing nearer and increasing in brightness. During the month its distance from us will decrease 16,100,000 miles.

Saturn also is a fine object in Aquarius in this month's evening sky, appearing as a yellow star of first magnitude in the south at sunset. It lies some distance nearly due north of the first magnitude star, Fomalhaut, in the constellation of the Southern Fish. The two are almost exactly equal in brightness at this time but Saturn is more yellowish in color than Fomalhaut. This star is the farthest south of the first magnitude stars visible in our latitudes and it may be seen only for a short time in the fall. It is one of our nearest stellar neighbors as its distance is only 26 light years.

Mars is now in Virgo in the morning sky and is growing brighter and rising earlier each night. Mercury passes from the morning to the evening sky at the time of its superior conjunction with the sun which occurs on November 18, but it will be too close to the sun to be seen this month.

The most noted and, at times, the most spectacular of all the annual showers of meteors, the Leonids, will make their usual return between November 13 and 16. The maximum display is expected in the early morning hours of November 15. As there will be no moonlight this year at that time more than the average number should be seen. It is known that the Leonids are moving in the same path as Tempel's Comet of 1866. Exceptionally great displays are expected every 33 years and have occurred with great regularity in the past. In 1799, 1833 and 1867 brilliant showers were observed. So great was the number that fell in the eastern part of the United States in the early morning hours of November 13, 1833, that the more ignorant and superstitious believed the end of the world was at hand. It was a great disappointment when the brilliant shower predicted for 1899 failed.

Although showers of more than average brilliancy were observed on November 14, 1898 and on the same date in 1901 the main shower of 1899 for some reason missed the earth entirely and the return of a great shower in 1932 or 1933 was also looked for in vain. The failure of the Leonids to appear in unusual numbers in these years has been attributed to the perturbations produced by the planet Jupiter which was in a position in 1899 to draw the densest portion of the swarm to one side so far that the earth would not encounter it. Unlike the Perseids, which are evenly distributed all around their orbit, the Leonids are closely bunched in one part of their orbit. When the earth encounters the densest portion of this group a display of great splendor may be expected. It takes about three years for this main group of the Leonids to pass the earth so unusually great displays may be expected for three years at intervals of thirty-three years which is the period in which the swarm makes one revolution in its orbit. Perturbations in the motions of the meteors in their orbits caused by the major planets Jupiter, Saturn or Uranus may, however, as in 1899 and 1932, switch the main stream out of the earth's path and spoil the display.

Our earth is still so near the main swarm of the Leonids that a display of more than average number may be seen this year, particularly since the moon conveniently will be out of the way. The Leonids move with the unusually high meteoric velocity of 44 miles a second and they are met by the earth "head on" in the early morning hours. They are intensely brilliant and bluish in color and, as their name indicates, their radiant lies in the constellation of Leo. It is, in fact, near the star Zeta Leonis in The Sickle. Although the meteors are actually moving in nearly parallel lines and coming toward the earth from this general direction, because of perspective they appear to radiate in all directions from this part of the heavens. As Leo rises after midnight one may not expect to see members of this swarm before the early hours of the morning. In a great meteoric shower a thousand or more meteors would be counted in an hour by a single observer, but the observer of the usual annual shower of Leonids will probably not count more than one every two or three minutes, even shortly before sunrise when the earth is encountering them in greatest numbers.

Those who are becoming acquainted with the constellations for the first time this fall will find the constellations of Andromeda and Pegasus, which are now on the meridian in the early evening, of special interest. The Great Square of Pegasus is one of the finest configurations now visible. Alpha Andromeda lies in its northeast corner.

Hiking and Camping Forum

Conducted by
ERNEST A. DENCH

Hiking and camping inquiries will be answered by mail if a stamped, addressed envelope is enclosed. Address the Forum editor.

Dressing for the outdoors in winter is important for real comfort, and thought must be given not only to what is on one's person but also what is to be carried in the way of spare equipment for emergency.

When Wintry Winds Do Blow — Words to the Wise

EARLY one winter morning a hiker-camper looked through the bedroom window of his city apartment. It was raining, and he engaged in silent debate with himself about what to wear for the trip. A train journey of about forty miles would, he knew, take him into sleet and, probably, heavily falling snow. On the way out to the campsite, reached by a gradual climb up to eleven hundred feet, he knew he could expect a north wind that would test the mettle of any hardy traveler.

Such treacherous days are common in winter, and they require resourcefulness in the use of clothing spares carried in one's pack. Even the trailer coach camper, with a complete wardrobe in his mobile home, may be caught in a blizzard while exploring some interesting back country on foot.

The temperature usually drops during a blizzard. Suspicious white spots appear on the ear lobes. The frost-bitten victim tries placing his gloved hands over his ears. Not only is this soon tiring, but such gymnastics make it difficult to keep balance on rough ground with obstructions concealed by snow and ice. Yet all the time an extra pair of woolen stockings is in the hiker's pack. One long stocking can, with the aid of a safety pin, be run around the forehead and over the ears. The ice darts will be pelting the hiker's neck full force, so the spare stocking becomes a muffler.

PHOTOGRAPH BY FREDERICK P. HEITKAMP, JR.

Why hug the fire at home in winter when you can enjoy a snack like this on the trail?

Another common incident, when the ground is semi-frozen, is accidentally to slip into a brook. A pair of cold and clammy gloves or stiff mittens will be a day-long reminder of this mishap. That extra pair of hose will serve as replacements.

"What wouldn't I give for a pair of gloves?" bemoans the camper busy with the hot pots and pans. All the time he is toting an extra pair of socks or stockings which, worn as gloves, will prevent burning his hands or—equally precious in the wilderness—spilling his food ration on the ground.

Here, offhand, are four possible supplementary uses for a pair of hose that add little to the weight and bulk of one's load.

From the skin out, dress for winter trips with woolen layers, giving the fullest insulation for the body. Other seasons it may be a case of *one* of everything, but *two* of each should prevail in winter. Some outdoor people make a mistaken fetish of summer and winter weights in garments, donning long, heavy woolen underwear in winter, when two light-weight suits would be more comfortable. The same layer plan applies to stockings, sweaters and coats.

More than one camper and hiker has secretly detested the woolen or flannel shirt he acquired as a Christmas gift. It itches terribly. So if the donor was one of the family, (Continued on page 315)

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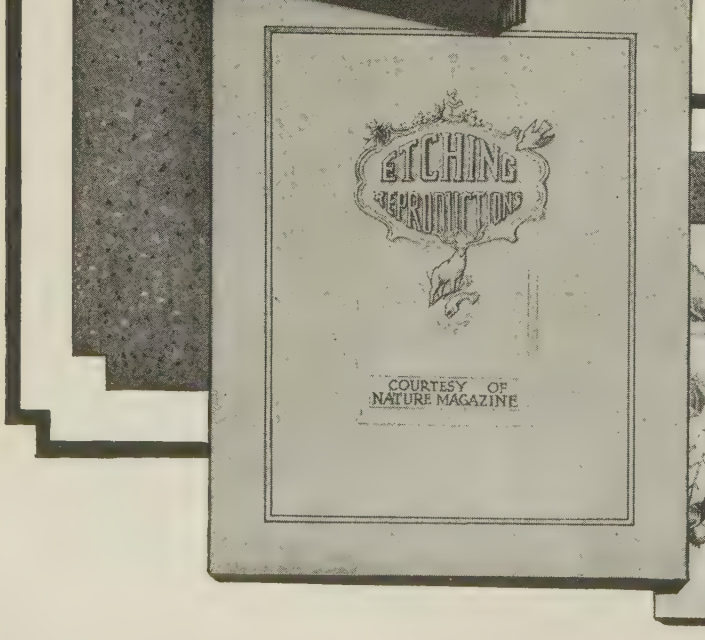

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Portfolios of Nature Etchings

Hundreds of etchings were considered in making the sel of eight subjects for our portfolio. They had to be represe of the best works of some of the outstanding artists who, th the medium of the etched plate, have brought us charmi tures of our wild birds and mammals.—The reproductio these pages can give only a small indication of the at portfolio of etchings themselves.

A few words about the Artists represented in this collection

Will Simmons—his etchings have brought the praise of art critics o sides of the Atlantic.

Diana Thorne—widely known for ability to picture dogs in all their and interesting moments.

Richard E. Bishop—once superintendent of a rolling mill; now throughout the world as an etcher.

Charles Emile Heil—specialized on bird etchings and his works a viewed in the museums in Washington, Paris and Munich.

Carl Rungius—one of our most noted etchers who specializes in p and etching of big game subjects.

Roland Clark—has centered his work on feathered game, choosing subjects birds of the eastern seaboard.

Winifred Austin—one of England's foremost portrayers of fur and f by means of the graphic arts.

L. R. Brightwell—one of England's leading etchers, internationally for his dry points of animals.

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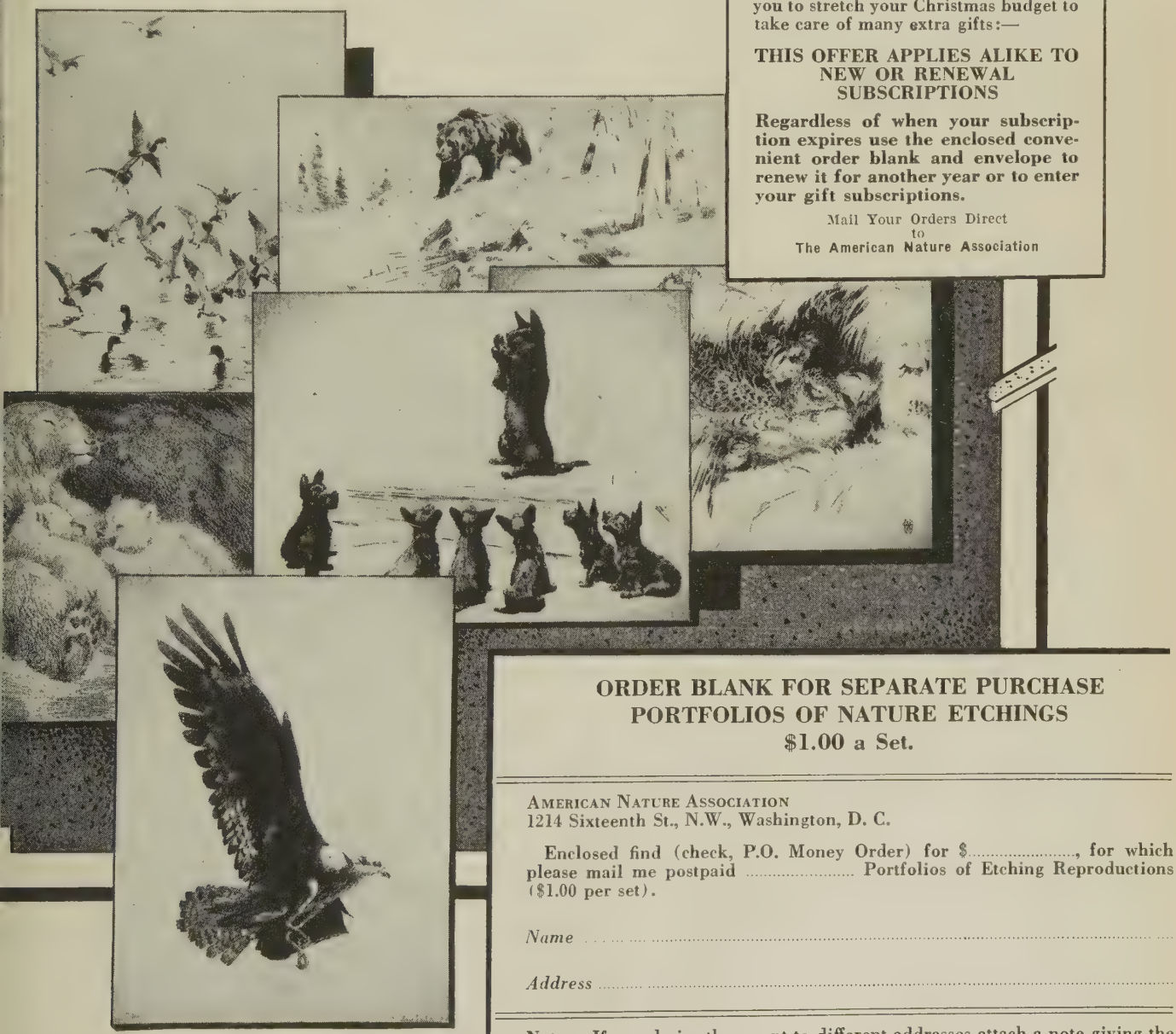

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Nature Magazine in School

A Department of Aid to the Teacher

The Red Fox in America

This delightfully written article by a leading authority is of great value as a reference as well as for immediate use. In strong contrast to the many species of animals that are rapidly becoming extinct, the ability of the red fox to maintain itself in the face of man's continued hostility arouses our admiration and deserves consideration in a science course.

This article attributes this success on the part of the red fox to:

1. Its adaptations, such as swift feet, keen ears, good nose, warm coat, bushy tail and well developed brain.

2. Its habits, such as avoidance of man and mating for life, which enable both parents to devote their energies to the rearing and training of young.

For elementary and junior high school pupils, the "Springfield Fox" in *Wild Animals I Have Known,* by Ernest Thompson Seton, is a good story to use in introducing the subject of foxes. In addition to reading about them, an idea of the adaptations may be presented through pictures and by sketches made by the pupils themselves. An understanding of the significance of the monogamous habits of the fox may be accomplished by contrasting the relationship between the length of the babyhood and the subsequent adaptability of the individual in a number of different types of animals, such, as, tomato worm—no parental care, offspring must depend on instincts and cannot change the pattern of response; rabbits—longer period of infancy, some parental care and adults can modify behavior to a limited extent; man—longest period of infancy of all and can modify his behavior more than any other creature on the earth. Foxes receive care from both parents during infancy lasting six months or more and the offspring show marked ability to modify their behavior.

Their wariness of man has also been a factor in their survival. It is a sad commentary on us that the tamer wild creatures are the first to be exterminated. Even in rural communities where the red fox is to be found, there are few children who have seen one. However, there may be some pupils who have found tracks of foxes in the snow or who have heard the bark. Comparison between dogs and foxes brings out the resemblances between these related mammals.

Through my own attempts to give protection to a den of foxes, the plight of the red fox has become a very personal problem with me. With "No Trespassing" signs in plain sight, neighbors have attempted to dig them out, blast them out, shoot them and trap them. The persons who have been most sympathetic toward my very uncertain efforts to provide a home for the foxes have been the fox hunters. They alone have cooperated in confiscating traps and patrolling the woods.

●

Conrad the Reticent

The importance of studying biographies of scientists should not be overlooked in the teaching of science. By reading and discussing the lives of great scientists pupils gain some insight into the scientific method and of the attitude of mind on the part of the scientist that makes the discoveries possible.

The life of Timothy Abbott Conrad illustrates the humility of spirit and steadfastness of purpose that characterise all great scientists. The orderly way in which he collected, labeled specimens and carefully preserved them for further study illustrates the way in which scientists work.

On Memorial Day, May 30, 1936, elementary school children representing all of the divisions of the Washington, D. C., Public Schools made a pilgrimage to the graves of a number of the distinguished ornithologists who are buried within the District of Columbia. The trip was sponsored jointly by the Audubon Society of the District of Columbia and the Public Schools. As the children talked the group seemed inspired. We all felt that we had made some progress toward one of the goals of our science program—namely, respect for the findings of science and for the methods by which these are obtained.

●

The Cycads

At any grade level in which the subject arises it would be a wholesome lesson to pupils to learn that a specimen cannot always be identified by its superficial resemblance to one already known. This article, and the cycad pictures in the rotogravure section, help to clear up the very common error of mistaking the fern-like impressions in pieces of coal for actual fern leaves. Pupils could be encouraged to have a small exhibit of pieces of coal showing these fern-like impressions. Some spore bearing fern leaves as well as cones of evergreens should be at hand for comparison. A discussion of the modes of reproduction of both types should be accompanied by examination of fern spores and the seeds of evergreens. With the differences between these types well in mind, pupils could discuss the question as to whether a fern would be a fern if it were found to be bearing cones and so establish the falsity of the assumption that the imprints in pieces of coal were fossil ferns.

In biology classes the reading of this article could be preceded by some research to determine whether or not the fern-like impressions found on pieces of coal were actually ferns, and what seems to be the relation between the cycads and the present-day evergreen conifers and ferns.

●

Beavers

These pictures clearly show that the beaver house is not only a home but a fortification as well. Pupils could construct a miniature beaver house out of sticks and mud and place it outside in cold weather to see how impenetrable it would become when it froze. An article on beavers appeared in the August, 1935, issue of NATURE MAGAZINE. Another excellent reference is "How Beavers Build Their Homes" by Vernon Bailey, in the Journal of Mammalogy, February 1926.

Beavers furnish a good example of a wild animal with a well-developed brain. The fact that they are not more successful in the fight for survival is because their aquatic lives make necessary the conspicuous house, which is poor protection against man.

●

Atmospheric Optics

An understanding of these phenomena depends largely on how much one knows about refraction of light. Questions dealing with light can well be begun in the elementary school by acquainting pupils with such phenomena as mirages, rainbows, sunset effects and circles around the moon. Unless the pupil is exceptionally gifted a real understanding of the principles involved cannot be acquired before the senior high school or even college level. In the elementary school pupils could collect pictures of these phenomena and perform some simple experiments such as putting a penny in a dish, viewing it from several distances, finding the place at which it was first visible and then, without disturbing the penny, filling the dish with water to see if the penny changed its apparent position. Other experiments such as placing a stick in water, noting that it appears to be broken at the surface of the water, or making a rainbow on the wall, using a prism, will help to give background for realization that there is such a thing as refraction. However, pupils should not be permitted to infer from these simple experiments that they understand all there is to be known about refraction.

In the case of the rainbow each little drop of water acts as a separate lens, breaking the light into the colors of the spectrum. The spectrum results from the different rates of speed of the different colors of light. The same phenomena may be obtained by focusing sunlight or light from a flashlight through a prism.

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science
Washington, D. C., Schools

Hiking and Camping Forum

(Continued from page 311)

he goes through the motions of wearing it on leaving the house and also when he returns at night. The rest of the day he slips into a cotton shirt and a sweater, carefully concealed from prying eyes in his pack or dunnage bag. Those who are unable to endure wool next to the skin can avoid the annoyance by using unbleached muslin as a lining for the neck, shoulders and armpits.

A shoe store salesman, adept at flattery, told a young woman to buy her winter high tops in a *tight* size. His argument was they would keep out the snow. One cause of cold feet is tight-fitting footwear. A sound rule in winter is to take one full size larger than is required for city street wear. This allows for the wearing of two pair of hose. If the cuffs of the outer pair are rolled over the shoe tops, snow or other moisture will not easily find entry.

Lack of knowledge of these essentials to winter comfort keeps many a hiker and camper hugging the home radiator, when he might be experiencing a perfectly glorious day in the open.

Gadget Service Simplified

Forumites may now be spared the time, effort and expense in writing in for further information on current gadgets. One written request, accompanied by 20 cents, will ensure being placed on our gadgets mailing list for one year. The service will start with the additional data you need on the following November gadget list:

1. An exceptionally good buy at 40 cents is a warm mitten made from blanket remnants. It's to be found in the fall-winter catalog of a Maine mail order outfitting house.
2. A new antiseptic declared to be an improvement on iodine and mercurochrome. It does not stain, and is also non-toxic and non-irritating.
3. Campers troubled with tough meat might like to know of a tenderizer. This bottled product, a pure vegetable essence of tropical origin, softens the connective meat tissues. It did the trick in the Forum editor's household.
4. A high-grade branded cheesecloth is good for camp dish-wiping operations. In an emergency it will serve as a face towel.
5. The by-product of a well-known linoleum firm is genuine cork insoles, flexible and strong; yet can be removed from the shoes in a jiffy after each trip.
6. A new flashlight giving a strong white light is circled, on the outside, by red glass, which, by its reflecting power, distributes the light in all directions. It should make it safer for night highway walking. Flashlight also has a metal bracket hanger, thus enabling the light to be focussed in any desired direction without using the hands.
7. Feminine winter sports enthusiasts seeking snap and color, coordinated with utility, should investigate a three-piece outfit originating in the West. The overalls, shirt and cap are adaptations from men's work clothing, in navy featherweight wool serge. If desired, a cotton twill plaid waist can be had instead of the wool flannel shirt.
8. A folding steel table (olive green) which sets up 15″ from the ground. By using the telescoped legs, height is increased to 28″. Top space area is 30″ x 30″, but folds, when traveling, to 15″ x 30″ x 2⅜″. Weighs 15 lbs. Locks up like a suitcase with a carrying handle.

SLUMBERING IN A ROLLING HOME. INTERIOR VIEW OF A TRAILER, MADE BY TROTWOOD. THESE ARE BRINGING OUT THE GIPSY IN MANY OF US

Brevities

The Guide School started by the Wisconsin Go-Hiking Club expects to develop new hike leaders. . . . The Obstacle Hike of the Nature Ramblers (Philadelphia) will, irrespective of what blocks the way, be routed due north for seven miles. The leader is allowed the remaining five miles in which to straighten himself out. He'll need 'em! . . . According to the Himalayan Club Journal, a party of six is an ideal number for any attack on Everest and nearby giants. . . . Latest Northern Scotland Youth Hostel takes a decidedly anti-spartan trend. It has electric light, hot and cold running water—and a bath, to be shared by the 62 occupants! . . . The Ramblers, new hiking unit of San Mateo Junior College (California), recently had a joint rock climbing trip with the Sierra Club, San Francisco Bay Chapter. . . . Horse-Shoe Trail developments in Pennsylvania: A party of horseback riders, in charge of Henry N. Woolman, covered the 139¼ miles in six days, making the overnights at hotels and cabins. Farmers are being approached to establish Youth Hostels. . . . 1937 plans of the Chicago District Outing Club include a chain of central west camping places. . . . The country's second highest peak is now only 65 feet below Mount Whitney. A new survey gives Mount Elbert (Colorado) a vertical angle measurement of 14,431 feet instead of its former 14,420 feet. . . . Following an overnight camping and hiking trip in the Pisgah National Forest by five Southern clubs, Dr. G. S. Tennent, Carolina Mountain Club editor, voiced the opinion that "it was a fine experience to meet the members of these other clubs." . . . Five members of The Mountaineers (Seattle) conquered Mount Goode this summer. This Washington peak, 9300 feet high, rises nearly 6000 feet from its Chelan National Forest base. It is a rock climb presenting technical difficulties. Summer before last a *Mazama* party failed within 150 feet of its goal. . . . Maine trail developments: Rangeley CCC camp has completed 40 miles of the Appalachian Trail from Grafton Notch east to Mount Saddleback. The six lean-tos here are exempt from the Maine guide law. The Arnold trail from the Kennebec River to Pierce Pond is also finished, and gives an alternate route via the Carry Ponds. Two lean-tos have been constructed at the Horns Pond. . . . The Friends of the Western Mountains is being revived. The organization's name perfectly expresses its purpose. An illustrated calendar of the western mountains will be mailed members this month. Particulars from C. E. Graves, Arcata, Cal. . . . A Jersey City hiking unit is known to outsiders as the H. A. C. Officers refuse to divulge what the initials stand for. This mysterious group, limited to 20 members, is, without consulting the N.Y.-N.J. Trail Conference, maintaining one trail on the Breakneck Ridge in the Hudson Highlands. . . . Martin A. Roudabush, former assistant U. S. topographic engineer, alleges Forum editor blundered in crediting Blue Knob Mountain (Pa.) with an elevation of 3220 feet. It should be 3136 feet. The Forum editor's figures came from the Information Division of the Resettlement Administration. . . . The small backyard maker of trailer coaches will probably be squeezed out of business next year, when several of the big auto manufacturers undertake mass production of trailers.

A Trailer Travelog

Late last winter Howard Vincent O'Brien and family temporarily abandoned their home in a central west city, rented a trailer coach and gayly started off for Florida. They managed to get there after numerous setbacks, in combating which the O'Brien sense of humor proved a boon, and finally reached home with the trailer still intact.

You can rent a trailer coach with the option, if later satisfied with gipsying, of having the rental applied toward the purchase price. O'Brien says that renting is a gamble, because for the same daily tariff the O'Brien family could have put up in small hotels. But O'Brien does concede that whether you buy in the first place or later on, you make a substantial saving over hotels or tourist cabins.

The trailer owner who keeps to the

trunk highways is continually faced with "the problem which the horseless carriage was to the livery stable." O'Brien thinks the gasoline companies should act quickly about providing adequate overnight parking facilities.

For a means of reaching the gateways to wilderness areas, and establishing a base camp there, the trailer coach has no superior. This is the O'Brien candid admission after experiencing the difficulties of urban travel.

Folding Bedouins is both an amusing and a practical book—and the publishers, Willett Clark and Co., Chicago, have given the reader a generous dollar's worth.

Stocking the Camp Larder

What staple food and housekeeping supplies should always be on hand in a cabin or camp regularly visited during week-ends?

There should be crocks or other vermin-proof containers each one-third filled with granulated sugar, confectioner's sugar, flour, salt, coffee, tea and cocoa. Equally essential items include one tin of pepper, one large box of matches, one cake each of toilet and household soap and a can of cleanser.

The above recommendations, based on the extensive experience of Miss Harriette Aull, Faculty Adviser, Smith College Outing Club, will seem rather elemental; yet they apply alike to the beginner and the old hand at the camping game. The person responsible for the commissary is liable to forget, and lists are not infallible. When something is omitted through an oversight—and there are the reserve supplies at the cabin to fall back on—all will be serene.

An Apple a Day—

The apple is the favorite fresh fruit in camp and on the trail at this season. Do you seek the variety of apple with the greatest nutriment value? If so, you will be keen to know the outcome of tests made by three professors of the University of Oregon Medical School.

The Spitzenberg, Winesap and Arkansas Black run neck-and-neck on vitamin-A value. However, they rank first, third and fourth, respectively, on vitamin-C content. No other apples hold such high ratings in the two divisions.

Gasoline Stove Users

The United Laboratories test different brands of gasoline used for gasoline pressure appliances, among which are camp stoves and lamps. This service organization is financially supported by most of the leading manufacturers of gasoline pressure products.

A quarterly folder published by the United Laboratories lists the gasoline brands which qualify for gasoline pressure stoves and lamps. As the approved gasolines are itemized by the states in which they are sold, it is a national service to campers.

Gasolines that make the grade are those with a low gum content, and combine stability with freedom from compounds likely to clog appliance generators.

This folder, free to appliance users, may be had by writing the United Laboratories at 240 N. St. Francis St., Wichita, Kansas. It also contains valuable hints on the selection, storage and handling of gasoline.

Government Rents Permanent Camps

A non-profit organization can now rent a large camp in a desirable location at an annual rental of $600.00. This opportunity occurs through the National Park Service being assigned the operation of the organized camps in the 46 recreational demonstration projects located in 23 states.

Mass camping bugbears will be avoided by dividing each camp into four or five small units, with a total capacity of 100 campers. The camps will be equipped with stoves, refrigerators, dining tables and benches, but the camping agency will provide all the other furnishings.

NOVEMBER'S SNOWS HOLD NO FEARS FOR HIKER DENCH AND HIS MERRY MEN

Auto Abuses on Club Hikes

Many a hiking club is illegally engaged in the taxi business. Before long, if a major accident occurs, it may be involved in costly lawsuits. Should a club not be incorporated, the responsible officers are likely to be involved. Individual auto owners may think they are covered with personal indemnity insurance, whereas it is void in some states if the car is being used as a common carrier.

The clubs are quite open about what they are doing. Compensation to each driver-owner is from one to four cents per mile, or a flat fee for each trip. In return auto owners are expected to perform a pick-up service at a central starting point, undertake shuttling operations if the hike is other than circular, and drop off passengers along the homeward route.

Many auto-owning hikers are making money out of the taxi service, despite the fact they would be driving up for the trip, anyway.

In some clubs this taxi service is ruinous to the fine spirit of comradeship which existed when a special bus was chartered, or the gang went up by train. It tends to create cliques and promote bad feeling. Some members don't like such and such a person's driving, or his car is too old to be safe, or one driver gets a better pay load than another driver. As for the unfortunate hike leader, his troubles are multiplied, especially on trips when not enough cars show up to transport the party. The Forum Editor still regrets the blazing hot day he had to squander scouting a criss-cross of back roads, to ascertain if the club cars could navigate them. The time he failed to do this a huge tree lay across the road—and the only axe in the party was a pocket knife!

Auto-owning hikers dread the tedious drive home, part of it in the dark along bad roads, after a hard day's hike. Their mental faculties are no longer alert. All clubs should return to the good old days of bus or train transportation, the many advantages of which are apparent.

Trails Over Private Lands

The natural diplomat among club officers should be appointed to contact landowners for permission to run a trail over private property. Property owners near any large city are often difficult people to deal with because they have to contend with so much vandalism. Good sportsmanship by users is essential if a trail is to continue as the equivalent of a right of way.

Almost anything in countryside scenery will do for trails near populous centers. But when trails are laid down at a goodly distance from the urban districts, dramatic surroundings are necessary. The more mileage required to reach a hiking base, the more finicky one becomes.

Trail standards are subject to the varying wishes of the landownets. Some will demand unmarked openings, to prevent intensive use by the kind of city people whose outdoor ethics are non-existent. Other owners will issue only temporary permits.

Signs flanking highways encourage vandalism. It is quite practicable to have unmarked trails for the exclusive use of well-intentioned and accredited hikers, by supplying them with detailed maps. Discreet paint blazes at the openings and exits are permissible.

Slowly but surely the clubs can sell the footways recreation idea, if they submit suggestions to their state planning boards.

Close-ups of Big Game

Photographic studies of mountain bighorn sheep, taken at close range, are being attempted at Nevares Spring in Death Valley National Monument, California, where blinds have been built to conceal the camera men. Five ewes and two lambs have been successfully snapped from a distance of about one-quarter mile without creating alarm, and it is hoped that close-ups will be possible by use of the blinds.

THE RED FOX IN AMERICA

(Continued from page 272)

Vulpes fulva macroura Baird, 1852
Type from the Wasatch Mountains near Salt Lake Valley, Utah.

A large, longtailed, light yellow fox inhabiting the Rocky Mountains from Alberta to New Mexico and the region from eastern Oregon to the Black Hills of South Dakota.

Vulpes fulva rubricosa Bangs. 1897
Type from Digby, Nova Scotia, Canada.
A large dark red fox with especially large bushy tail; found in Nova Scotia, southern Quebec and probably northern Maine.

Vulpes fulva deletrix Bangs. 1898
Type from Bay St. George, Newfoundland.
About the size of *rubricosa* but pale straw yellow in color. Supposed to be restricted to Newfoundland.

Vulpes fulva bangsi Merriam. 1900
Type from L'Anse au Loup, Strait of Belle Isle, Labrador, Canada.
About the size of *rubricosa* but with smaller ears, less black on ears and legs and of a general golden fulvous color. Inhabits Labrador.

Vulpes fulva regalis Merriam, 1900
Type from Elk River, Minnesota.
The largest of all our red foxes, with very long tail and large ears. Color golden yellow, paler on face and rump, much black on legs and tail. Ranges from the Great Lakes to the Rocky Mountains, and from Saskatchewan to Kansas.

Vulpes fulva alascensis Merriam. 1900
Type from Andraefski, near mouth of Yukon River, Alaska.
A large, longtailed red fox with small ears and long fur on neck and shoulders. Color red or golden red much as in typical *fulva*. Ranges over most of Alaska and eastward to an unknown distance.

Vulpes fulva harrimani Merriam. 1900
Type from Kodiak, Alaska.
A large fox with large tapering tail, coarse hair and a conspicuous ruff of long hair on neck. Color grizzled, yellowish red, with little black on feet and tail and little white on tip of tail. Known only from Kodiak Island.

Vulpes fulva kenaiensis Merriam. 1900
Type from Kenai Peninsula, Alaska.
Size of skull large with especially heavy rostrum and molar teeth. Known only from skulls; external characters not known. Possibly restricted to the Kenai Peninsula.

Vulpes fulva abietorum Merriam. 1900
Type from Stuart Lake, British Columbia.
Skulls lighter, slenderer and longer than in *alascensis*, its nearest ally. Known only from skulls; limits of range unknown.

Vulpes fulva cascadensis Merriam. 1900
Type from Trout Lake, south slope of Mount Adams, Washington.
The short tailed, small-toothed fox of the Cascade Mountains, differing from the form of the Rocky Mountains. Color straw yellow, lighter on top of head and tail. Most specimens are in the darker cross fox color-phase.
Inhabits the Cascade Range from southern British Columbia to Mount Lassen, California, mainly among rocks high up.

Vulpes fulva necator Merriam. 1900
Type from Whitney Meadows, south of Mt. Whitney, California.
A mountain fox nearest to *macroura* of the Rocky Mountains, but smaller, with shorter tail. Color dull reddish, becoming yellowish on sides; much black on feet, legs, top of tail and back of ears. Generally in cross fox color-phase.
Ranges in southern High Sierra, mainly in Hudsonian Zone.

Oregon Wild Life

The issuance of *The Mammals and Life Zones of Oregon,* being No. 55 of the North American Fauna series of the Bureau of Biological Survey, United States Department of Agriculture, completes a series of state reports by Vernon Bailey, veteran naturalist of the Survey, that will long be outstanding. The others referred to are on the *Physiography, Life Zones and Mammals of North Dakota* (No. 49), and *Mammals of New Mexico* (No. 53).

Systematic study of Oregon's natural history began in 1896 when Mr. Bailey and Dr. C. Hart Merriam, founder and chief of the Biological Survey, with the assistance of the present reviewer, spent the summer in various parts of that State studying its fauna and flora. Since then many other parties have worked in the State at all seasons. In the volume now under review, Mr. Bailey has brought together not only data from all these studies, but also those gleaned from the literature. Thus the published reports of the visits of exploring parties to the coast or the interior of the State in the early part of the 19th century—Lewis and Clark, David Douglas, Ross Cox, Gabriel Franchere, Peter Skene Ogden, John K. Townsend, Thomas Nuttall, Alexander Henry, John C. Fremont, and others—have been drawn upon for notes on conditions during primitive times. It is regretted that a little space was not devoted to the circumstances attending the visits of these pioneer explorers.

The bulk of the report is devoted to the extensively annotated list of mammals, occupying pages 57 to 393. This extremely valuable list maintains the high standard set by Mr. Bailey in his previous reports, above cited. The annotations include a tremendous amount of information that could be obtained only by patient and intelligent research carried on for many years among pioneers, most of whom have since passed away. A valuable feature is the inclusion of the marine mammals.

Mr. Bailey was retired from the Government service in 1933, after forty-six years of service. But such men never retire from work, and it is worthy of note that he later devoted several months of work to revising and helping the present volume through the press. He has long been eminent as an "all-round" naturalist of the old school, an outdoor, in preference to an indoor, student. The first article published by NATURE MAGAZINE was from his pen, and there have been many since, one in the present number.

A bibliography of about nearly 200 titles is appended. We regret to note that the custom of using only the initials of the given names of authors, in obedience, we believe, to a Government Printing Office rule, is still in force, and unfortunately is becoming increasingly prevalent in other quarters. Since a line is given to the author citation, no space is saved, and the custom of using initials only seems to be a concession to laziness. As writers increase in number any help in identifying the myriad Browns and Joneses becomes increasingly useful both to authors and their readers.

We regret also that the usefulness of the report has been lessened by confining the index to mammal names and type localities. The names of birds, reptiles, and plants would have added only a few pages to the fourteen now covered by the index, but would have widened greatly the book's sphere of usefulness.

The report can be obtained from the Superintendent of Documents, Washington, D. C. for seventy-five cents in cash.—E.A.P.

Our Forests

Here Are Forests, a booklet prepared by the Forest Service, Department of Agriculture, tells the story of the management of 170 million acres of national forests by the Federal government. It sketches the result of the spoliation of much of America's forest land in the past, and details the efforts of the Forest Service to produce a maximum of forest resources without tapping the capital stock of growing trees. The booklet, pointing out that the forests of America are a basic source of power, and a continuing source that can be maintained when the world's supply of coal, oil and gas are depleted, was distributed to the delegates to the Third World Power Conference meeting in Washington, D. C.

Photographic Annual

As usual, the American Annual of Photography is a beautiful and useful book. Volume Fifty-one, the 1937 edition, has just come to hand from the American Photographic Publishing Company, 428 Newbury Street, Boston, Mass. Beside reproducing a most generous number of fine pictures, the annual includes a wealth of valuable photographic articles covering such subjects as infra-red photography, movies in color, Civil War photographers, the miniature camera, control of contrast in copy work and many other important features for the photographer, both amateur and professional. Copies of the annual may be obtained from the address given above at $1.50 for the paper-bound edition and $2.25 for the cloth-bound volume.

To Protect the Hudson

Dedicated to the preservation "in its natural state the Hudson River and its valley and to preserve the historic landmarks thereof", the Hudson River Conservation Society has been organized on the initiative of William Church Osborn, General John Ross Delafield, Louis V. Ledoux, Langbourne M. Williams, Jr., and Henry C. deRham. The Society plans to cooperate with existing agencies, State and Federal, concerned with the development and use of the river. It is planned to make a continuing survey of the river and its valley as to conditions affecting health and recreation, and the Society will devote itself to creation of public opinion and support of preservation of the natural beauties of "the Rhine of America." The Society will have its headquarters at West Point and offices in New York.

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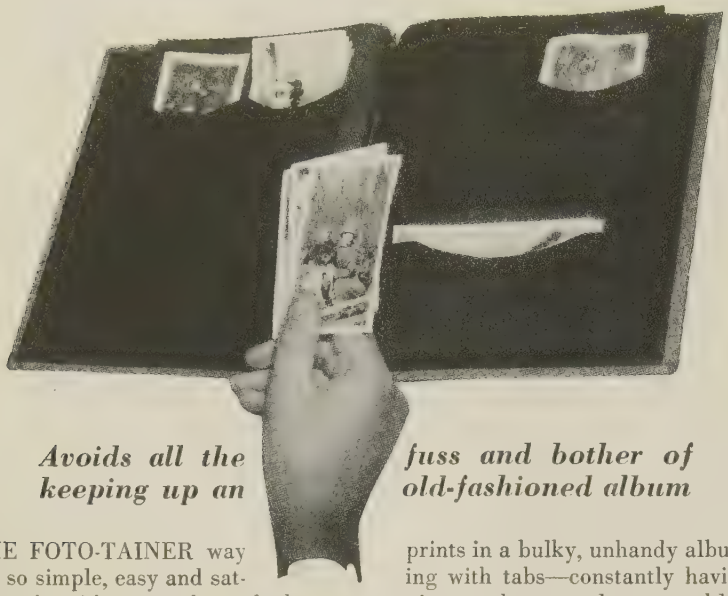

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A Question Book

George W. Stimpson is president of the National Press Club in Washington, so, inferentially, he should know everything. If he doesn't he at least knows where to find it, as witness the latest of his question and answer books—*Uncommon Knowledge.* This has had three popular predecessors, *Nuggets of Knowledge, Popular Questions Answered* and *Things Worth Knowing.* We have always found it fun while waiting for our wife to put on the finishing touches, or at other times when a snatch of reading is in order, to pick up one of these books and learn something. Leafing through Mr. Stimpson's latest we find such questions as: What was the South Sea Bubble? How did the squirrel get its name? Does hot water crack a thin glass more easily than a thick one? How did "a little bird told me" originate? How far east did the range of the buffalo extend? The answers are concisely written and entertaining. The author has provided an excellent index, and if you want to find the answers to the above questions and hundreds of others, the book costs two dollars from a book store or the publisher, The Bobbs-Merrill Company.

A Book on Eyes

Why We See Like Human Beings is the title of an interesting book that has recently come to our attention. It is published by the Better Vision Institute, Inc., Rockefeller Plaza, New York, and bears no author's name. It is a book, however, of interest to anyone who wants to know more about eyes and it is specially adapted for school work. The graphic illustrations add much to the value of the text. There are some amazingly interesting facts about eyes of both human beings and wild forms that bear upon Nature's adaptation of the eye to a wide variety of purposes.

Youngsters' Travel Books

Two interesting little travel books for the rising generation have recently come to our attention. They are entitled *It Happened in South Africa* and *It Happened in Australia* and are the joint work of Leila Gott Harris and Kilroy Harris. Both Mr. and Mrs. Harris have travelled extensively in both countries and Mr. Harris has lectured widely about them. In these two books they have created a small family and the reader sees the countries through the eyes of Jane and Paul. Both books are profusely illustrated. The publishers are McKnight and McKnight of Bloomington, Illinois, and the price of each book is one dollar.

Little Black Ant

Alice Gall and Fleming Crew have collaborated again to produce another charming Nature story for youngsters, this one entitled *Little Black Ant.* It is, of course, the fascinating story of ant life and these two authors give to it their usually attractive touch. To be sure, they indulge in dialog between various members of the insect world but it is so handled that it does not offend as does most dialog of this sort. They do not try to accord to their insect people a background of human experience and, hence, human conversation. The book is published by the Oxford University Press and sells for $1.50.

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Dr. Frank R. Oastler

It is with regret we record the passing of Dr. Frank Richard Oastler, Nature lover, ardent conservationist and adviser of the National Park Service. An eminent physician-surgeon of New York, Dr. Oastler served the National Association of Audubon Societies for several years as a director, and also as vice-president. He was also well-known as a photographer of birds and mammals, and his collection is one of the finest in the country. His friends of Yellowstone, his favorite Park, will remember him as one who often tramped the trails, camera in hand, photographing the elusive wild creatures.

Tree Book

Our Friends the Trees, by Dr. P. G. Cross, is a book of scientific accuracy, literary accuracy and charm. Besides being a distinguished scholar in other fields, Dr. Cross has studied and tended trees as a special hobby for many years. The book is designed especially for those who want to know how to take care of their own trees and contains many charts and information on pruning, spraying and transplanting. It is neither dry nor technical but human in the treatment of the relationship between the trees and our home and land. Illustrated, the volume is priced at $5.00 and is available from the publishers, E. P. Dutton and Co., Inc., New York City.

Lumbering Textbook

Tales of an Old Lumber Camp, by John Hamlin, an excellent book for teachers desiring to teach the fundamentals of the lumbering industry and the value of reforestation, is available from D. C. Heath and Company, publishers, at a list price of eighty cents. The method of approach is novel, in that the history of the industry is woven into the story of a young boy who lived in a western lumber camp and grew up to follow in his father's footsteps.

Common Mushrooms

An excellent, inexpensive booklet with the above title has been prepared by Leon L. Pray of the Field Museum of Natural History, Chicago. Those interested in mushrooms as a food will find it valuable as a means of identifying the commoner species of edible and poisonous fungi. The species discussed are illustrated from photographs by Dr. Edward T. Harper and Susan A. Harper, whose extensive collections were bequeathed to the Museum. The booklet is available from the Museum for fifty cents.

Nature Study Projects

Many interesting projects for Nature study work are suggested in detail in a 65-page mimeographed pamphlet brought out by the National Youth Administration in Minnesota, 312 Minnesota Building, St. Paul. The objective of this publication is to direct attention to the possibilities of Nature study for youth both as a means to providing activities and to provide a background of Nature appreciation in the interests of conservation.

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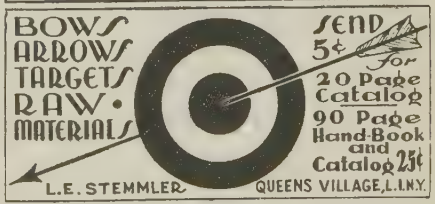

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Indiana Audubon

We always look forward to receiving the Yearbook of the Indiana Audubon Society, a publication perennially packed with interesting ornithological notes, observations and records as well as information on the activities of the Society. The 1936 Yearbook has recently come to hand, a 56-page illustrated booklet intriguingly bound. As usual, Indiana's State Bird, the cardinal, is in evidence on the cover. It would be futile to try to review the contents but if you want a copy send one dollar to Harold Zimmerman, 915 West Gilbert St., Muncie, Indiana.

Windbreak Trees

The Department of Agriculture, completing a 20-year test, has found that the Chinese elm, the green ash and the chokecherry are the best trees for windbreaks in the northern Great Plains states. The tests began at Mandan, N. D., in 1914, and plantings were completed in 1917. The willows, poplars and birches that were set out began to die a few years after planting, but ninety percent or more of the three species mentioned above have survived the dryness and extremes of temperature in that area.

Dr. Russell Appointed

Dr. Carl P. Russell, formerly chief of the Museum Division of the National Park Service, has been named Chief of the Wildlife Division of the Service, filling the place left vacant by the tragic death of George M. Wright. Dr. Russell entered the National Park Service as ranger-naturalist and soon became Park Naturalist of Yosemite National Park. During the six and one-half years in that capacity he developed the outstanding museum in Yosemite, laying the ground work for the extension of this activity in other Parks.

Rafinesque Again

Still another book has just appeared concerning Constantine Samuel Rafinesque, (1783-1840) who, it will be remembered, was an American naturalist of the early part of the last century whose vast learning and marked peculiarities made his career particulary vivid and colorful. It is entitled *Rafinesque's Kentucky Friends,* and it has been written and published by Dr. Harry B. Weiss (19 North 7th Avenue, Highland Park, New Brunswick, N. J.). The present edition—a beautiful work—has been limited to 150 copies, illustrated by 25 previously unpublished pencil sketches made by Rafinesque of relatives, friends and associates while he was professor in old Transylvania University at Lexington, Kentucky. It is set up in 12 point Caslon Old Face type and is printed on ivory dull-coated paper, and is attractively full bound in blue cloth, 72 pages, 6 by 9 inches, price $7.50. A friend and contemporary of Thomas Jefferson, John James Audubon, and other natural history students of that period, probably there never lived a more enthusiastic pioneer than was Rafinesque in the various branches of botany and in zoology, in travel, in exploration, and in archeological work. Also because of his activities as editor and literary worker he will long be remembered. It is well to have his career again directed from time to time to the attention of present day natural history students.

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Bulb Book

Adventures with Hardy Bulbs is the title of a new book written by Louise Beebe Wilder, a pioneer in the use of bulbs not widely grown. Mrs. Wilder's book is non-technical and stimulating and calls attention to many species that are uncommon on this side of the Atlantic. Much attention is also given to the native bulbous plants that have received little notice in their own country. The commoner species and varieties have their place as well, and many suggestions for interesting arrangements are made. The subject is excellently covered, there being chapters on bulbs for the rock garden, for naturalizing, for beds and borders and for every sort of purpose. Published by The Macmillan Company, New York, the book is available for $5.00. It is illustrated with photographs and drawings by Walter Beebe Wilder.

Flowers and Their Travels

Many have wondered whence came the flowers of our garden. Accordingly, Frances Margaret Fox has written a book with the above title wherein she sets down what she has learned about the origin of various flowers and how they came to our shores. Besides searching out the true origins, the author has uncovered many delightful legends that have come down from ancient times. It is primarily a volume for the younger reader. The book is available from the Bobbs-Merrill Company, New York, for $1.50.

Seeing America First

Travelling America set an all-time record for visiting its own National Parks and Monuments during the year ending September, 1936. Nearly ten million persons, one-fourteenth of the entire population, went sightseeing, an increase of more than 4,000,000 over 1935 and more than 6,000,000 over 1931. The newly-established Shenandoah National Park proved to be the greatest attraction with nearly 700,000 visitors, and Rocky Mountain National Park led the western group with 550,000 outdoor lovers. Even Mt. McKinley National Park, Alaska, reported over one thousand visitors, an increase of 25 percent over last year.

Photographic Notes

BY SAMUEL BROWN

Winter

Winter's snow, ice and scenery make fascinating photographic subjects. The soft, mellow outdoor light of December and January gives a distinct and delicate tone to trees and branches. The winter hiker and vacationist will find much of interest to photograph.

Outdoor picture taking during the winter is more exacting as regards exposure and film material than during the summer. Winter daylight is weak and relatively rich in red and yellow quality. For this reason it is best to use panchromatic films. Exposure must also be reasonably accurate in order to render the delicate tones and gradations in snow.

Special equipment is not required. A lens aperture of F. 6.3 is desirable although not entirely essential. A lens hood is important for the production of negatives with brilliance. Many times during the winter there are occasions when longer exposures are necessary than can be given when the camera is held in the hand. On these occasions a tripod is a handy accessory.

As the sun is likely to melt snow and ice shortly after it falls, it is best to take the photographs as soon after a snowfall as possible. Beautiful effects are prevalent when snow has fallen in still air and lodged on the branches of trees. A photograph of such a subject is especially attractive when taken

A SKIING PARTY CAUGHT ON S. S. PAN AT 1/100 OF A SECOND

against the sky with a light yellow filter. This filter darkens the sky somewhat and makes the subject stand out in sharp contrast. The morning after a cold night generally finds everything coated with ice and icicles hanging from trees and shingles. The sparkle reflected from these adds to their beauty and makes interesting pictures.

Careful attention to exposure is a prime requisite in taking winter photographs because these subjects must be rendered in a high key or shades of light grey and white. Underexposure results in lack of detail in the shadows while overexposure chokes up the highlights, and instead of rendering snow delicately it records a mass of uninteresting white. The tendency is to underestimate the reflecting power of snow and to overexpose. An exposure meter is an invaluable aid.

A light yellow filter having a factor of about two times will lighten up the shadows and add to the brilliance of the finished picture.

A CRISP WINTER MORNING AND A NEW FALL OF SNOW BRING THE CAMERA ENTHUSIASTS OUT IN SEARCH OF SCENES LIKE THESE

Christmas Cards

The coming of December brings with it the season of cheer and good will. This Christmas we can extend our good wishes to our friends and relatives with a distinctive greeting card made in our darkrooms. These require very little more work than ordinary prints and are entirely personal in the message that they carry.

There is available from your regular dealer an outfit especially designed to simplify Christmas card making. This consists of a number of negative masks with appropriate inscriptions and spaces for inserting a negative of a personal subject and a name.

Almost any winter scene can be appropriately used on a Christmas card. A night picture of your home covered with snow, the baby's photograph, pictures of last year's Christmas tree or holly wreaths are some suggestions.

Silhouettes also are excellent subjects and are easily made. It is necessary to have two adjacent rooms with a wide doorway. This is covered with a white sheet tightly stretched to prevent wrinkles. A brilliant light source such as one or two photoflood bulbs is placed in one room about three feet from the curtain and in the other room the subject is placed two feet in front of the curtain. A short exposure will record the light parts leaving the subject silhouetted against a white background.

Christmas cards should be printed on double weight paper about four inches by five. They can be made somewhat more attractive by appropriate coloring or toning.

Photography has advanced by leaps and bounds. The past few years have brought undreamed-of developments such as the polascreen, practical infra-red and ultra-violet photography, and many more. This department will be happy to prepare articles on the practical application of these latest developments but, as always, its policies are governed by the interests of its readers. We should like to have each individual express his opinions and make suggestions.

Films

The use of *orthochromatic* film has largely replaced regular film for general use. As pointed out last month, regular film is sensitive only to the lower portion of the spectrum consisting of ultra-violet, violet and blue light. Orthochromatic film has been further sensitized to include greens, yellows and browns. Its primary advantages, in addition to increased color sensitivity, are added speed and the lengthening of the picture taking day.

Two further unique features deserving of special mention are its double coating and anti-halation backing. The first mentioned permits remarkable latitude in exposure because of its two emulsions. A slow emulsion is coated on the film base and on top of this is placed a high speed emulsion. The first prevents overexposure which causes weak whitewashed effects while the second prevents underexposure resulting in black sooty pictures. The combination makes a fast, well balanced film for all general purposes.

While halation, or the spreading of light from bright reflecting surfaces, is largely prevented by the double coating, the back of the film is dyed a brilliant red. Thus, any actinic light getting through to the back is almost completely absorbed.

While the grain of orthochromatic film is somewhat larger than that produced by regular films, it is fine enough so that enlargements of reasonable size can easily be made. When processed in fine grain developer, extreme enlargements are possible.

For practical purposes orthochromatic film may be rated as having a speed of 19 degrees Scheiner or 16 when used with a Weston meter. These ratings apply only to light of daylight quality. When used in conjunction with Mazda light the Scheiner speed is 16 and with a Weston meter a factor of 6 is allowed. These ratings are approximately double that assigned to regular film.

Due to its greater sensitiveness to the middle portion of the spectrum, orthochromatic films render blue sky slightly darker than regular film. However, the rendition is still

too light to be absolutely correct and the difference between sky and clouds is too little to be attractive. With the exception of spectral red, to which orthochromatic film is blind, colors may be fully corrected with the aid of color filters. The most valuable are the different shades of yellow which comprise the series of Wratten "K"s. The K-1 filter, which is the lightest, gives slight correction and increases the contrast between sky and clouds. This filter has a factor of 2½. The K-1½ filter gives slightly better correction but has a higher factor—4 times normal exposure being required. The K-2 filter has a factor of 4½ times but gives the best correction possible with orthochromatic films.

It is sometimes desired to obtain extreme contrast between sky and clouds, particularly for a sunrise or sunset or to simulate a night effect. This can easily be secured with the aid of a Wratten "G" filter which is a very deep yellow tending toward orange. To give a fully timed negative the exposure should be increased 10 times.

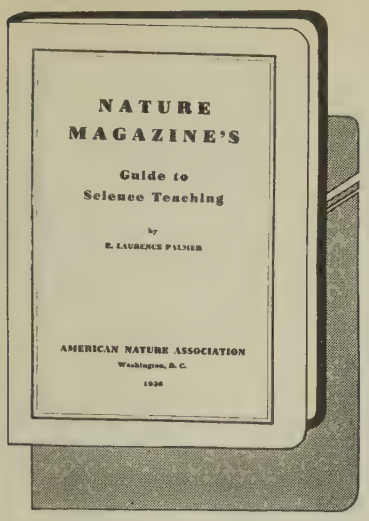
There are many well known orthochromatic films available, outstanding among which are the well known *Verichrome, Plenachrome, Fine Grain Plenachrome* and *Super Plenachrome.*

PHOTOGRAPHIC EDITOR SNAPPED ON A WINTER HIKE LOOKING FOR SUBJECTS

Trade Hints and New Books

Winter, to many of us, means a cessation of photographic activities. There is, however, much that one can do with the camera on a cold winter night. Table top photography, informal snaps of friends, silhouettes, flashlight and photoflood pictures are only a few of the subjects covered in *"Picture Taking At Night"*, which is available from this department without charge. It will suggest many a winternight's enjoyment. Send a stamped, self-addressed envelope *plus a two cent stamp* for your copy.

The new 35 MM Kodachrome for still cameras recently announced proved an instant success and we now learn that this film is being produced in Type "A" for use



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Burke & James of 223 W. Madison St., Chicago, Ill. announce the introduction to the American public of the Ditmar 8 MM camera for motion pictures. We regret that space does not permit a full description but we do predict its immediate popularity. We suggest that interested persons watch for detailed announcement through regular photographic channels or write to the above address for further information.

The Fomo Publishing Co., Canton, Ohio, publishers of photographic books, have added two new books to their ever increasingly popular list. Covering two important and interesting phases of photography we recommend these for the photographer's library.

The first of these, *"Correct Exposures"* by William Alexander, analyzes the many factors that influence exposure. Each individual item is carefully and exhaustively discussed, not with the intention of confusing or involving the subject, but to enlighten the reader on the question of exposure. Many questions in the mind of the reader are answered intelligently and understandably. The real photographic enthusiast *needs* this book. Price $1.00.

"Camera Journalism with the Miniature Camera" by George W. Hesse is the second of Fomo's new books. Almost everyone that uses a camera is anxious to have his hobby pay him dividends. Mr. Hesse, Editor of the *Photographic Digest,* has the practical experience which has fitted him to write this book and to teach amateurs how to take and sell pictures that editors will buy. Price $.75.

"Elementary Photography" by Neblette, Brehm and Priest, published by the Macmillan Co., distributed by the Eastman Kodak Co., Rochester, N. Y., price $1.00.

The need for an authoritative text on photography for use in the schoolroom, club and by the individual has at last been filled with the publication of *"Elementary Photography."* Elementary in nature, it follows the progress of a picture from the making of a pinhole camera to the completion of a finished picture. Really practical in every respect, it gives its reader the essentials without involved theory. This book is intended primarily as an aid to a technically perfect picture rather than a help to the pictorialist. The beginner will find this book a valuable asset to his photographic library.

The photographic department of Nature Magazine is devoted to its readers interested in photography and maintains a service which renders assistance with any photographic matter. You are invited to take advantage of this service. Address all photographic inquiries to Samuel Brown, Nature Magazine, 1214 Sixteenth St., N. W., Washington, D. C.

Cordially,
Samuel Brown

Rural School Leaflet

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year, appearing in September, November, January and March, round out a program that will make the Leaflet of use in the elementary grades of rural schools as well as through the tenth grade.

The September, 1936, issue, which has just come to hand, follows somewhat the thought of the corresponding issues for the past two years except that the suggestions for teaching science and Nature Study now can be applied to grades seven through ten. The leaflet is prepared by E. Laurence Palmer, Professor of Rural Education, Cornell University, and is published by the New York State College of Agriculture at Cornell.

The Leaflet will be found to be a great help for teachers of the grades mentioned. Even those who feel that they must follow the orthodox organization of most text books will find this number of the Leaflet valuable. The realms of experience suggested, and the topics commonly treated in general science and biology have so much in common that the Leaflet will serve to enrich the other offerings. Professor Palmer points out that the proposals are not designed as a substitute for sound programs that are now functioning satisfactorily.

The subsequent three numbers of the 1936 school year are written for children. The November issue discusses spiders; the January, subjects ordinarily classed as physical science; the March, life in the sea. To make these services of the College of Agriculture more real, a type of extra-mural class that carries university credit with it was started last year. Communities that desired to make the most of the opportunity were visited by members of the university faculty. Inquiries about such classes for this year or about the series of Leaflets may be directed to Professor Palmer or to the Director of Extra-Mural Classes of Cornell University, Ithaca New York.

Handbook for the Curious

An excellent volume with the above title has been written by Paul Griswold Howes, Curator of the Bruce Museum of Natural History at Greenwich, Connecticut, and an author familiar to readers of Nature Magazine. As Mr. Howes points out in his preface, the title of the book tells the whole story as it is "deliberately and simply" a book for the curious and nothing more.

The animals discussed are somewhat orderly arranged according to their position on the genealogical tree of life, and because of this the author fears he will be accused of simply writing another natural history, but it should be made clear that the book is intended for those whom he describes as "the army of fortunate people whom I designate as the curious." Many persons have brought small animals found in the Connecticut area to Mr. Howes with the inquiry: "What in the world is this strange creature?" From the myriad questions asked came the inspiration for the *Handbook*.

The material is excellently presented and is fully illustrated with more than 300 photographs and sketches by the author. We became so absorbed in the descriptions of the characteristics of some of the commoner "bugs" seen in our own back yard that we were half way through the book before we remembered a review had to be written. The book will be a fine addition to any Nature lover's bookshelf. Priced at $3.75, it is available from Putnam's Sons, publishers, N. Y.

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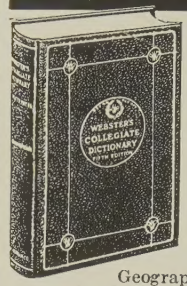

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In December—Whittier

By HOWARD ZAHNISER

JOHN GREENLEAF WHITTIER was December's child, and the quality of the charm of the best of his poetry is identical with the quality of reminiscence that is both poignant and pleasant. Year's end, winter, December—the month is preeminently the time for even the outdoor person to sit with others "the clean-winged hearth about" and read or muse over books that suit the cosy fancy. Of all the poets, none seems so fitting and proper and congenial as Whittier for these winter occasions, and it may be truly said that he is a poet of Nature, howsoever strict one may be in his use of the term.

In a scholarly study of *Nature in American Literature* (published by Macmillan, good fireside reading for anyone interested in either subject), Norman Foerster has found that about forty flowers blossom in Whittier's poems, that nearly thirty birds have found their way into his verses, and that trees "are still commoner in Whittier's poetry—in all well-nigh thirty species, a number of which recur again and again." Of special interest to winter readers is Professor Foerster's observation that "in something like sixty-five poems the pine is mentioned or described, while the birch, the nearest rival, occurs only fifteen times, the maple a dozen times, and willow three or four times." Significant in any understanding of Nature as transplanted into Whittier's poetry is Foerster's description of the poet's use of the pine: "The characteristics of the pine that he returned to again and again are its tenuous music when the wind touches its strings; its sturdy, steady growth, rarely tainted by decay; and its evergreen quality. The first of these brought an infinity of somberly romantic suggestions, the last two the sense of eternity. The pine retains its foliage and melancholy music when other trees are bared by autumn blasts, and it naturally became for him a symbol of sadness and survival; he, too, mourned when, year after year, friends left him for the land of fronded palms. There is something evanescent and light-hearted, even trivial, in the airy willows and aspens; and there is something 'hoary-wise' and permanent in the dark and fragrant pine."

There is permanence only in the past. Reminiscence is the only way of contemplating things of mortality that do not change. Of the future Whittier could write:

> I know not where His islands lift
> Their fronded palms in air;
> I only know I cannot drift
> Beyond His love and care.

But the past, with all its bygone vicissitudes, is permanent; *there* is experience that may never change. It is a wintry moodiness that suggests these paradoxes, and no poet whose work is sensitive to the rhythm of the seasons is so conducive to such a mood as is Whittier. Think of the outstanding poems known to all, and all of them beautiful with a nostalgic reminiscence, some of them with a definite winter setting.

Best of all, "Snow-bound: A Winter Idyll," that like marvellous music casts its distinctive spell with the very opening measures:

> The sun that brief December day
> Rose cheerless over hills of gray.

When Whittier's work—completed, the poet gone to the islands of fronded palms—was gathered into the definitive seven-volume edition published by Houghton, Mifflin and Company, the poems were classified, and it seems now that the best of all December reading has found its way into one of these volumes—Volume 2 with its three groups, Poems of Nature, Poems Subjective and Reminiscent, and Religious Poems. Where could the outdoors person choose better for the reminiscent month of December with the religious connotations of its Christmas season?

The very opening poem of the volume phrases a prelude of invitation, "The Frost Spirit:"

> He comes,—he comes,—the Frost Spirit comes! You may trace his
> footsteps now
> On the naked woods and the blasted fields and the brown hill's
> withered brow.

Only a few pages farther on is "A Dream of Summer," a winter dream, with its oft-sung hope:

> The Night is mother of the Day,
> The Winter of the Spring,
> And ever upon old Decay
> The greenest mosses cling.

And the reader hunts up (in the same volume) that undimmed favorite even in this day of feet shod even from infancy, "The Barefoot Boy" with its catalog of

> Knowledge never learned of schools,
> Of the wild bee's morning chase,
> Of the wildflower's time and place,
> Flight of fowl and habitude
> Of the tenants of the wood.

One knows well enough without his saying it, but is thankful for the saying, that Whittier himself in his boyhood

> . . . was rich in flowers and trees,
> Hummingbirds and honey-bees.

With returning consciousness of the weather without, one reads with a more seasonal enjoyment Whittier's "Flowers in Winter," his appreciation of the painter's art to give a permanence to the most pleasant things and also his appreciation of the uses of winter. With gentle sympathy for the artist, he appeals:

> Fill soft and deep, O winter snow!
> The sweet azalea's oaken dells,
> And hide the bank where roses blow,
> And swing the azure bells!
>
> O'erlay the amber violet's leaves,
> The purple aster's brookside home,
> Guard all the flowers her pencil gives
> A life beyond their bloom.
>
> And she, when spring comes round again,
> By greening slope and singing flood
> Shall wander, seeking, not in vain,
> Her darlings of the wood.

In one evening there is time for such sampling of only a few of Whittier's poems, but there are many long evenings in December and many poems, and certainly there should be one entire evening with "Snow-bound."

"—A BIRD OF SUPERLATIVE CONTOUR AND COLORING."